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Standardization

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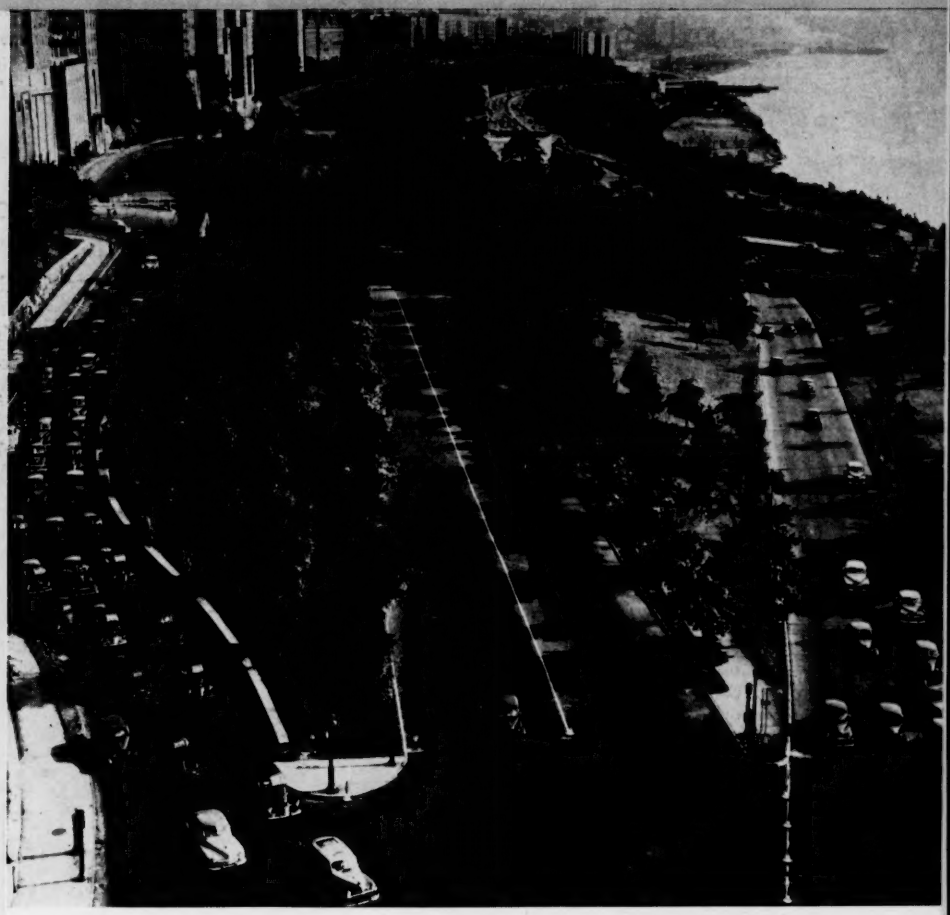

INTERNATIONAL SIGNS FOR WORLD'S TRAFFIC

World Auto Travel Made Easier

As increased speed of travel causes the world to shrink, ease of travel becomes increasingly important. U.S. visitors to other countries will have little trouble when proposed UN traffic signs are in use. PAGE 239

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Company Members—More than 2300 companies hold membership either directly or by group arrangement through their respective trade associations.

Marginal Notes

C. Le Maistre—

It is with deep regret that we announce in this issue the passing of one of the world's pioneers in standardization (page 255). Charles Le Maistre was well known in this country and highly respected for his devotion to the cause of standardization. He had been extremely active in business until his final illness, only a few months ago. He was an enthusiastic squash player and was in the habit of playing once a week up to the time he was taken ill.

In Our September Issue—

That article on the new type of connections for anaesthetic gas cylinders—promised last month—will definitely appear in the September issue.

Also in September, we can promise you a highly interesting article on industrial purchasing by Sam Watson of RCA.

The first installment of the new feature on Government standards has received all the necessary OK's from Washington and is ready for the printer. As we told you last month, this feature is being prepared by S. P. Kaidanovsky, who has had many years in Government service. The monthly feature will not concentrate entirely on the Federal government, however. Mr Kaidanovsky will also cover state and city standards activities.

The Fourth National Standardization Conference—

Interesting plans are under way for this year's National Standardization Conference. ASA's 35th Annual Meeting will open the Conference on Monday morning, October 19. A forum on the problem of industrial noise is well under development. The Administrative Committee of the Company Member Conference has made preliminary plans for discussions of topics that are vital to every company standards department. It

only remains for final details to be completed before the program can be officially released.

Of course, there will be a session on purchasing—as the profit margin slowly shrinks, standards are being recognized more and more by purchasing departments as essential means for securing the most efficient materials to do the job with least cost and best results.

Award of the Howard Coonley Medal and Standards Medal will be made at a luncheon Wednesday, October 21.

Plan to be in New York
October 19, 20, 21
at The Waldorf-Astoria

What Is Your Question?

This recently instituted column (see page 250) is bringing in comments and additional questions from STANDARDIZATION readers. Please address the Editor when sending your question.

Our Cover Photo Courtesy of Standard Oil Co (N. J.)

Opinions expressed by authors in STANDARDIZATION *are not necessarily those of the American Standards Association.*

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AUGUST, 1953 VOL. 24, No. 8

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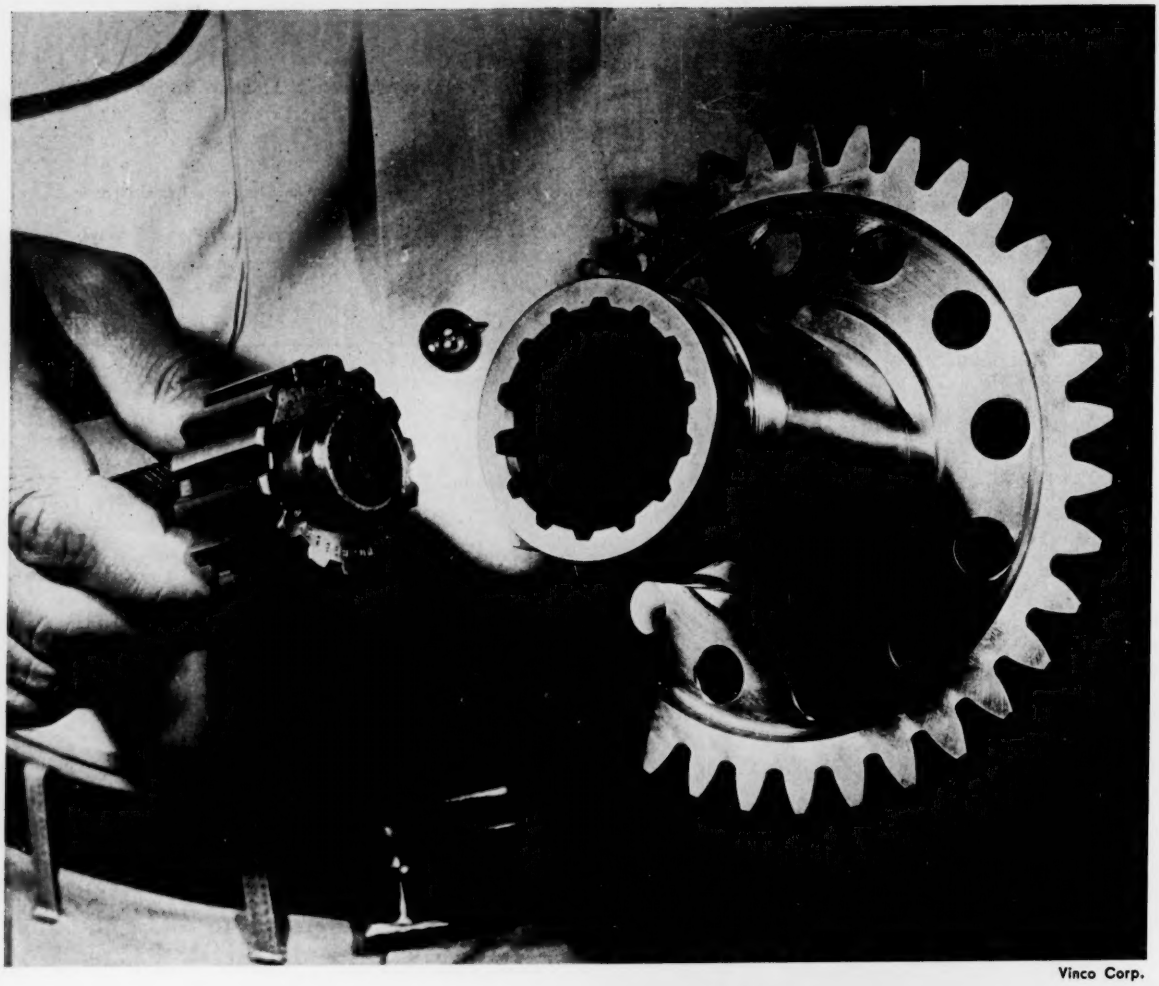
Standardization is dynamic, not static. It means not to stand still, but to move forward together.

Single copy 35¢. $4.00 per year (foreign $5.00). Schools and libraries $3.00 (foreign $4.00). This publication is indexed in the Engineering Index and the Industrial Arts Index. Re-entered as second class matter Jan. 11, 1949, at the P.O., New York, N. Y., under the Act of March 3, 1879.



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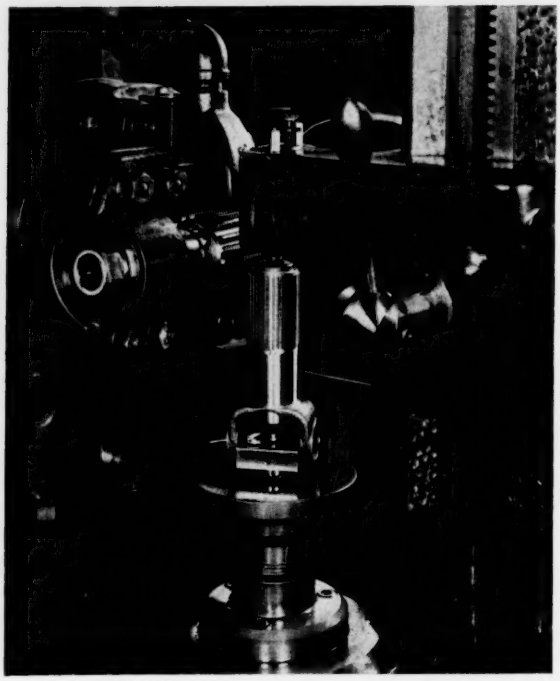


SPLINES AND SPLINE GAGING

Photograph at top—A spline gage is being used to check a splined component.

At right—Rough hobbing a spline on the shaft fitting of an automotive propeller

From Denham & Co for Michigan Tool Co, Courtesy *American Machinist*

A New Standard for Spline Gaging

by George L. McCain, Chrysler Corporation
and
Albert S. Beam, Vinco Corporation

The two American Standards on involute splines discussed in this article were developed by Sectional Committee B5 on Small Tools and Machine Tool Elements. This committee, sponsored by the American Society of Mechanical Engineers, the Metal Cutting Tool Institute, the National Machine Tool Builders' Association, and the Society of Automotive Engineers, has a broad program of standardization work under way.

Copies of the American Standard on Involute Splines, B5.15-1950, can be obtained at $2.00 each; the American Standard on Involute Spline and Serration Gages and Gaging, B5.31-1953 at $1.25.

SPLINES are machine elements consisting of integral keys (teeth) and keyways (tooth spaces) arranged in a circle.

The concept of spline design, which assumes contact on a multitude of matching tooth surfaces, cannot be fully realized because of unavoidable errors in spacing, tooth profile, parallelism, and out-of-roundness. For many years, the lack of a comprehensive method of dealing with these errors seemed to make it impossible to obtain agreement between design specifications and manufacturing realities. The 1950 revision of the American Standard B5.15 for Involute Splines, herein designated as *Spline Standard*, recognizes the existence of these unavoidable irregularities and provides a methodical treatment of spline errors which makes it possible to manufacture and inspect spline components in accordance with required fit conditions and all other specifications.

The recently published American Standard B5.31-1953 for Involute Spline and Serration Gages and Gaging, herein designated as *Gaging Standard*, follows the basic concept of the Spline Standard and presents a comprehensive system of spline inspection. A number of inspection plans are introduced, each of which is designated by a number. The specification of any one number expresses the complete gaging requirements for a spline component (see Fig. 2, Fig. 3, and Table 3, American Standard B5.31-1953) so that only the necessary equipment will be procured. Thus, the new Gaging Standard provides the missing link between engineering, processing, inspection, and purchasing.

The Gaging Standard consists of

1. An introductory section which provides the basic correlation between this Gaging Standard and the Spline Standard.
2. A presentation of inspection plans or control systems which establish the basic types of required inspection equipment (Amer Std B5.31-1953, pp 8 and 9).
3. A detailed description of the general design and function of various gages (Amer Std B5.31-1953, pp 10-15).
4. Complete data on gage tolerances and formulas for gage dimensions (Amer Std B5.31-1953, pp 16-21).

The material in the Gaging Standard is presented primarily for use with involute splines. The corresponding application of the same principles for involute serrations is covered on the last page of the Gaging Standard.

In order to facilitate the use of the new Gaging Standard, it may be appropriate to discuss the basic concept of the Spline Standard which deals with "effective" space width and tooth thickness.

The effective space width of an internal spline is equal to the circular tooth thickness at the pitch circle of a theoretically perfect external spline which would fit without freedom or interference.

In practice the theoretically perfect external spline is represented by a *composite spline plug gage* (with a full complement of teeth). The internal part spline is not an ideal member because it has spacing errors and other irregularities as illustrated in Figure 1A. It will not accept the composite spline plug gage if the space width of the part spline is equal to the tooth thickness of the gage as shown in Figure 1B. Thus, it will be necessary to widen the spline spaces by the accumulated effect of the errors in the part spline (see Figure 1C). An *error allowance* is provided in the Spline Standard for this purpose. By adding this error allowance to the effective space width of the internal spline, we obtain the *dimensional or actual space width* which may be defined

---

Mr McCain is chairman and Mr Beam is secretary of Subgroup 1A on American Standard Spline Gages and Gaging of the Sectional Committee on Small Tools and Machine Tool Elements, B5. This subgroup was organized in 1947 to develop the spline gaging standard. Its 35 members represented gage makers, tool makers, and gage users. Subgroup 1A on gaging worked under Technical Committee 13 on splines. S. O. Bjornberg, Illinois Tool Works, is chairman of this committee, with Mr McCain as secretary.

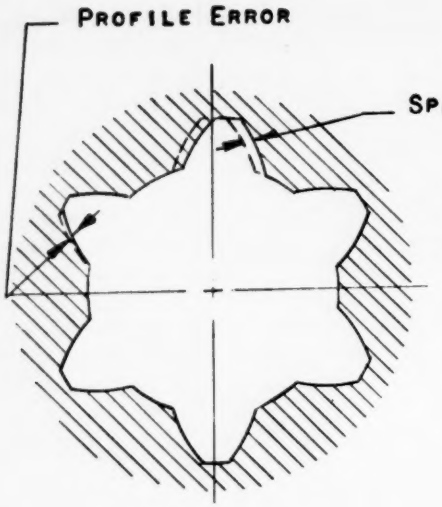


Figure 1A—Internal spline with errors. Width of each space is basic.

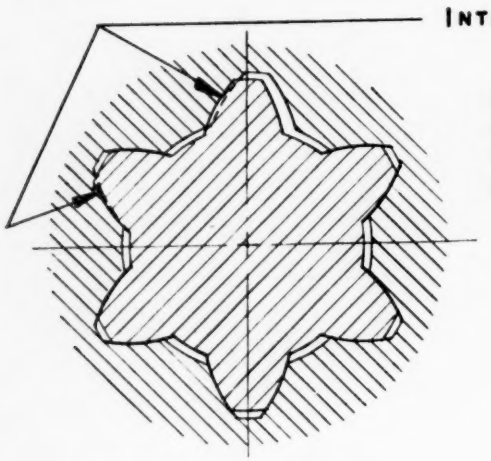


Figure 1B—Internal spline interferes with perfect external spline which has basic tooth thickness.

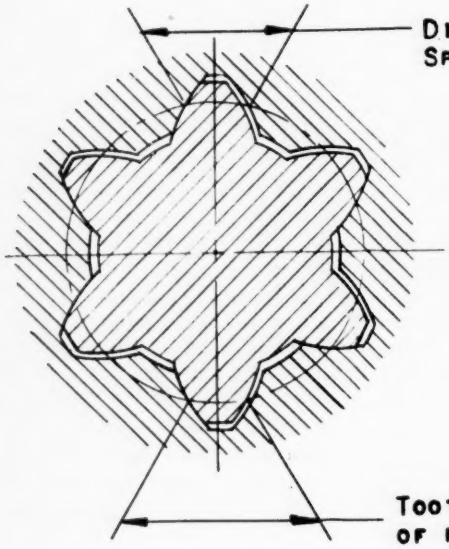


Figure 1C — Dimensional space width of internal spline must be enlarged to exceed the tooth thickness of a perfect external spline that fits.

as the width of single spaces. The tolerance which is allowed on the variation of this dimensional space width is the *machining tolerance*. The sum of error allowance and machining tolerance represents the total spread between the minimum effective and the maximum dimensional space width, as illustrated in Figure 2.

Figure 2 also shows the corresponding dimensions of the external spline, such as maximum effective and minimum dimensional tooth thicknesses.

Table 1 of the Gaging Standard (Amer Std B5.31-1953, p 5) summarizes the dimensional construction of splines and presents all necessary data for the determination of error allowances and machining tolerances given in the Spline Standard.

Tables 5 through 25 of the Spline Standard (Amer Std B5.15-1950, pp 16-51) list only the extreme space width and tooth thickness dimensions, such as minimum effective and maximum dimensional space width of the internal spline.

Table 1 of the Gaging Standard permits the computation of the intermediate dimensions, such as maximum effective space width, minimum effective tooth thickness, minimum dimensional space width, and maximum dimensional tooth thickness. The relation of these intermediate dimensions to the extreme dimensions listed in the Spline Standard is shown in Figure 3 of this article. This bar chart shows the variation of dimensional space width and tooth thickness as machining tolerances and also illustrates the difference between the effective and dimensional size as error allowances. The maximum effective space width would, therefore, be equal to the minimum effective space width plus machining tolerance or the maximum dimensional space width minus the error allowance. The intermediate dimensions are needed for some inspection control systems.

The principle of the standard and its procedure may be used even if error allowances or machining tolerances are altered to suit special applications.

The use of effective and dimensional sizes leads to four limit dimensions for each part in place of the previous two limits for space width and tooth thickness. The Gaging Standard introduces various control systems, each of which requires a certain combination of limit dimensions and associated types of inspection equipment. These control systems are illustrated in Figures 4 and 5 of this article and further defined in Section 7 and Table 3 of the Gaging Standard. Since the selection of a control system depends on the spline application, this information of the Gaging Standard in effect supplements the Spline Standard.

There are two major and fundamentally different control systems which, in the Gaging Standard, are designated as C-101 and C-103.

In *Control System* C-101, only the extreme limit dimensions are maintained. The spread between these dimensions represents the sum of the error allowance and the machining tolerance; either the errors or the machining variations may exceed their individually assigned spread. However, such deviations cannot become serious as explained below. To illustrate this system, we may refer to a splined shaft. In order to meet the specified maximum effective tooth thickness, this external spline must enter a "Go" composite spline gage. Due to the errors of spacing, profile, parallelism, and out-of-roundness, the thickness of individual teeth (dimensional tooth thickness) must be reduced below the space width of the ring gage. The specification of the minimum dimensional tooth thickness places a limit on the permissible reduction.

An increase beyond the error allowance of spline errors obtained in the manufacturing process would occur at the expense of machining tolerance. This, in turn, is revealed through an increase in the scrap rate. On the other hand, excessive machining variations are permitted only in the direction of a tooth thickness increase. This requires a corresponding and most desirable reduction of spline errors or leads to a rejection by the "Go" composite ring gage.

Control of *minimum effective space width and maximum effective tooth thickness* excludes unplanned interferences and thereby assures assem-

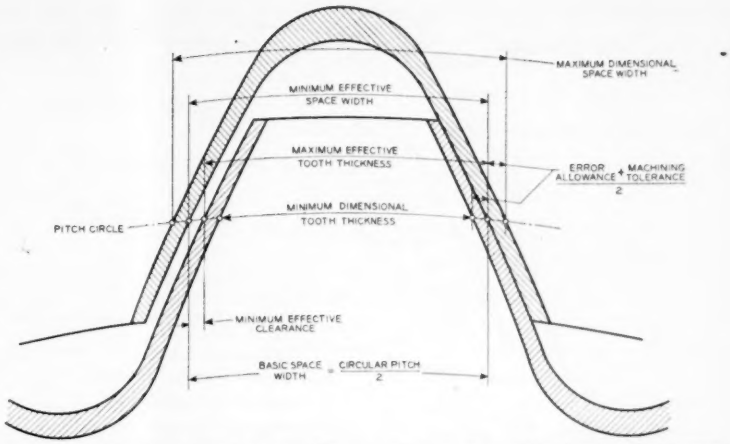
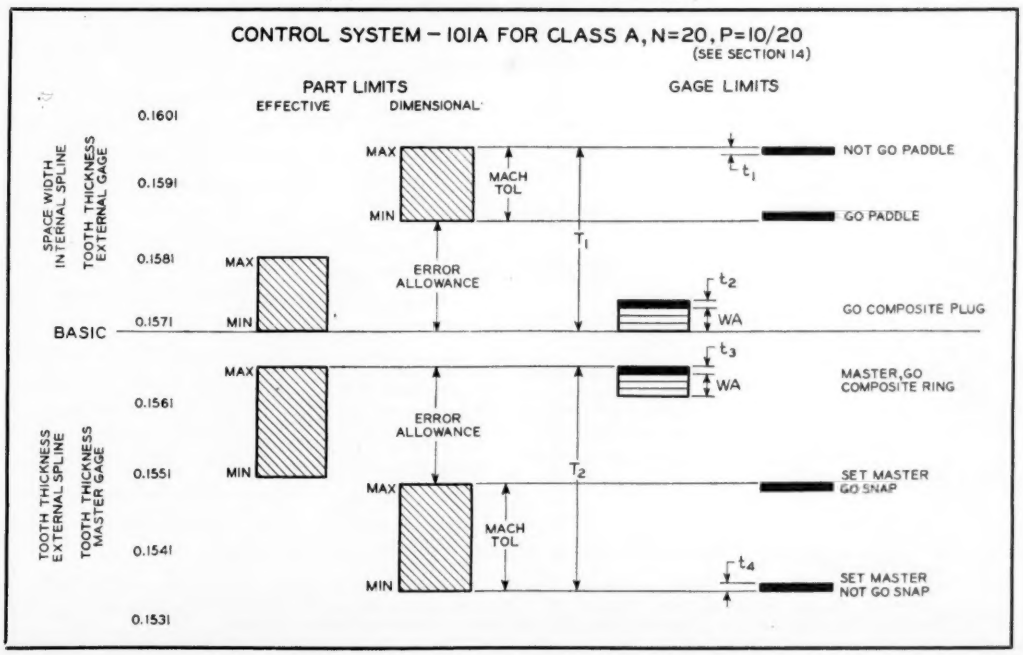
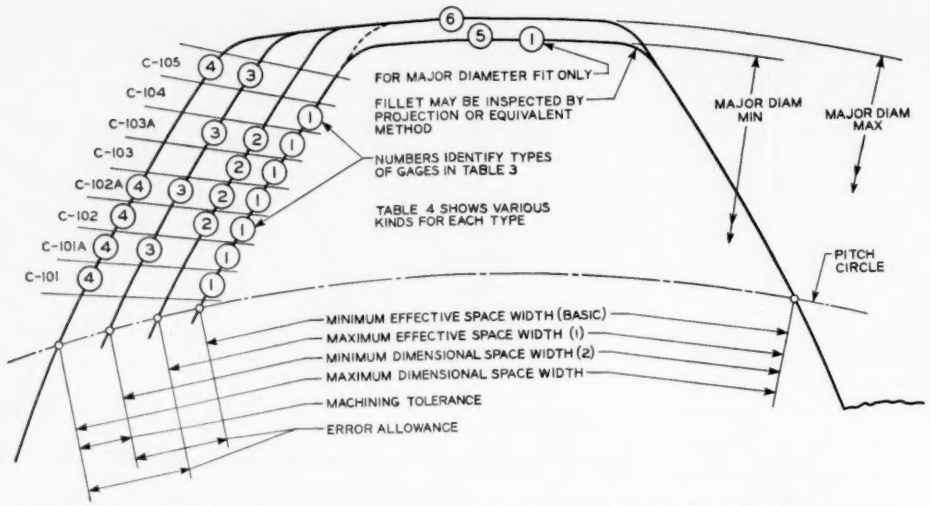

MAXIMUM DIMENSIONAL SPACE WIDTH
MINIMUM EFFECTIVE SPACE WIDTH
MAXIMUM EFFECTIVE TOOTH THICKNESS
ERROR ALLOWANCE + MACHINING TOLERANCE / 2
MINIMUM DIMENSIONAL TOOTH THICKNESS
PITCH CIRCLE
MINIMUM EFFECTIVE CLEARANCE
BASIC SPACE WIDTH = CIRCULAR PITCH / 2

Figure 2—Spline tooth and space (Fig. 1 of American Standard B5.31-1953)

Figure 3—Application of control system showing relation of tolerances for parts and for gages (Fig. 4, American Standard B5.31-1953)





(1)—This is obtained by adding the machining tolerance to the minimum effective space width.
(2)—This is obtained by deducting product machining tolerance, Table 1, from the maximum dimensional space width (column 15 of INVOLUTE SPLINE STANDARD). It is greater than the maximum effective space width for the large majority of splines.

Figure 4—Application of different control systems to internal spline space (Fig. 2, American Standard B5.31-1953)

(Table numbers in diagram refer to tables in Gaging Standard.)

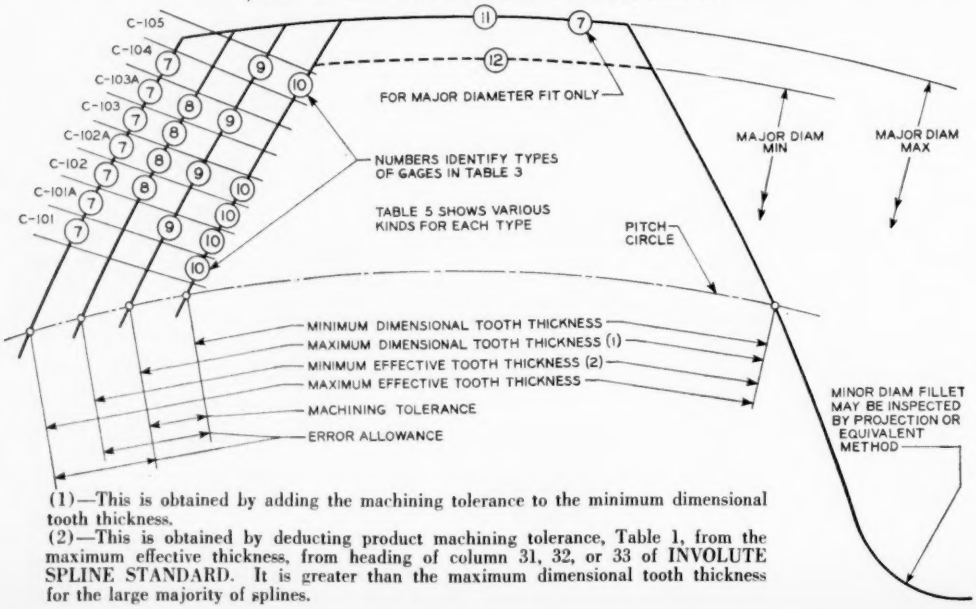
bly with the mating part. Control of the extreme *dimensional* specifications prevents excessive clearances between any set of mating tooth profiles and thereby assures a reasonable percentage of contact area under load. Control System C-101 is, therefore, recommended for splines which require wear life under load.

Control System C-103 is used for an entirely different type of spline application. In this system, only the effective sizes are acceptance limits for final inspection. Since the effective space width and effective tooth thickness establish the fit of mating parts, the use of C-103 maintains the specified amount of backlash (effective clearance) between spline components rather than the width of individual spaces and teeth. Spline errors are not restricted under this system — which means that wide spaces or thin teeth are acceptable as long as spacing errors or other irregularities prevent excessive looseness. This system is recommended for instrument splines which transmit motion rather than power, also for some press fits where localized interference is sufficient.

Control System C-102 represents a modification of Control System C-101 and is sometimes used to maintain backlash within design limits. If only the extreme limits of Control

Figure 5—Application of different control systems to external spline tooth (Fig. 3, American Standard B5.31-1953)

(Table numbers in diagram refer to tables in Gaging Standard.)



(1)—This is obtained by adding the machining tolerance to the minimum dimensional tooth thickness.
(2)—This is obtained by deducting product machining tolerance, Table 1, from the maximum effective thickness, from heading of column 31, 32, or 33 of INVOLUTE SPLINE STANDARD. It is greater than the maximum dimensional tooth thickness for the large majority of splines.

System C-101 are maintained, it is conceivable that parts would be at or near the maximum dimensional space width and minimum dimensional tooth thickness without the full amount of anticipated spline errors. In this case, the effective space width could be oversize, the effective tooth thickness undersize, and the looseness between mating components may be excessive. In most cases, this risk is negligible because substantial reduction of spline errors is improbable. However, when the amount of errors in spacing, profile, parallelism, and out-of-roundness could be substantially less than the designer's estimate, and when such a circumstance would lead to an excessive increase of effective clearance, the maximum effective space width or minimum effective tooth thickness could be added to the data of Control System C-101. This then becomes Control System C-102.

Each of these three control systems can be further modified by additional reference specifications for minimum dimensional space width and maximum dimensional tooth thickness (see C-101A, C-102A, and C-103A). These supplementary dimensions are almost never used to establish acceptance or rejection of parts. If, for instance, the dimensional space width of the product is less than the given minimum, without causing the effective space width to be undersize, the product errors would be less than the assumed error allowance. In this case, the full error allowance is not needed and the quality of the spline is better than anticipated. For the same reason, the maximum dimensional tooth thickness may be oversize as long as the maximum effective tooth thickness is maintained.

Specifications for the two supplementary dimensions are usually desired for processing reference and are optional. They enable the machine operator to judge whether or not machining variations are within anticipated limits (see Gaging Standard, Section 8, S, p 8). They also help the inspector to determine the cause of rejections by "Go" composite plug and ring gages; such

NUMBER	DIMENSION	CHECKED BY
1	Minimum effective space width	"Go" composite plug gage
2	Maximum effective space width	"Not Go" composite plug gage
3	Minimum dimensional space width	"Go" Paddle Plug or minimum pin measurement
4	Maximum dimensional space width	"Not Go" Paddle Plug or maximum pin measurement
5 & 6	Minimum and maximum major diameter of internal spline	Major diameter Plug Gages
7	Maximum effective tooth thickness	"Go" composite ring gage
8	Minimum effective tooth thickness	"Not Go" composite ring gage
9	Maximum dimensional tooth thickness	"Go" tooth thickness snap gage or maximum pin measurement
10	Minimum dimensional tooth thickness	"Not Go" snap gage or minimum pin measurement
11&12	Maximum and Minimum Major diameter of external spline	Major diameter ring or snap gages

Table 1—Application of numbers shown in Figures 4 and 5.

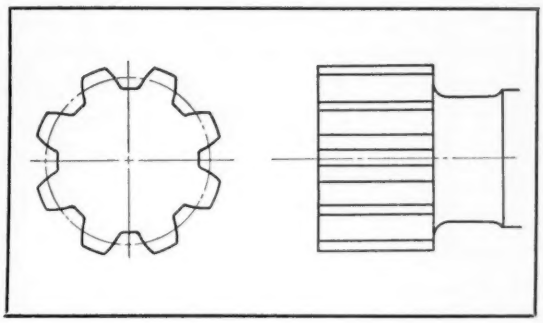


Figure 6—Go composite side fit plug gage for checking minimum effective space width (Fig. 1A, Table 4, American Standard B5. 31-1953)

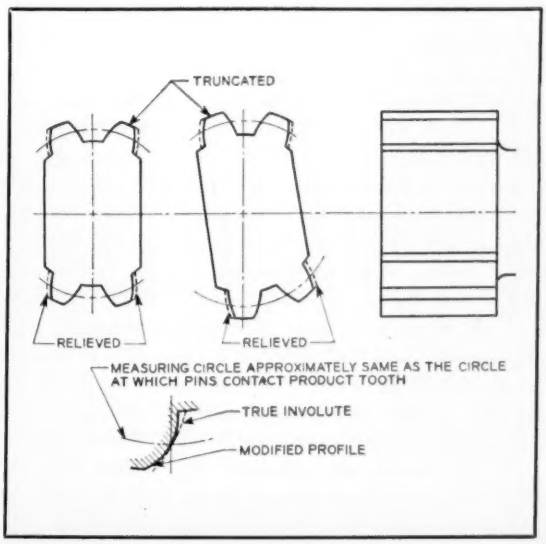


Figure 7 — Not Go paddle plug gage, for checking maximum dimensional space width (Fig. 4A, Table 4, American Standard B5.31-1953). Optional profile modification duplicates contact of measuring pins.

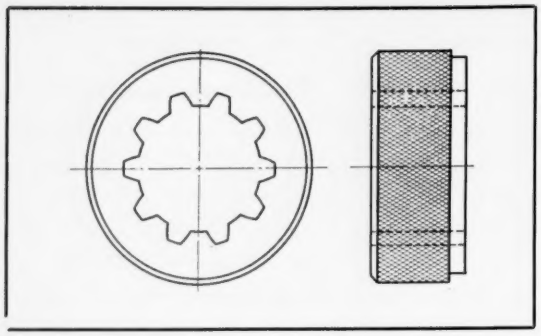


Figure 8—Go composite side fit ring gage, to check maximum effective tooth thickness (Fig. 7A, Table 5, American Standard B5.31-1953).

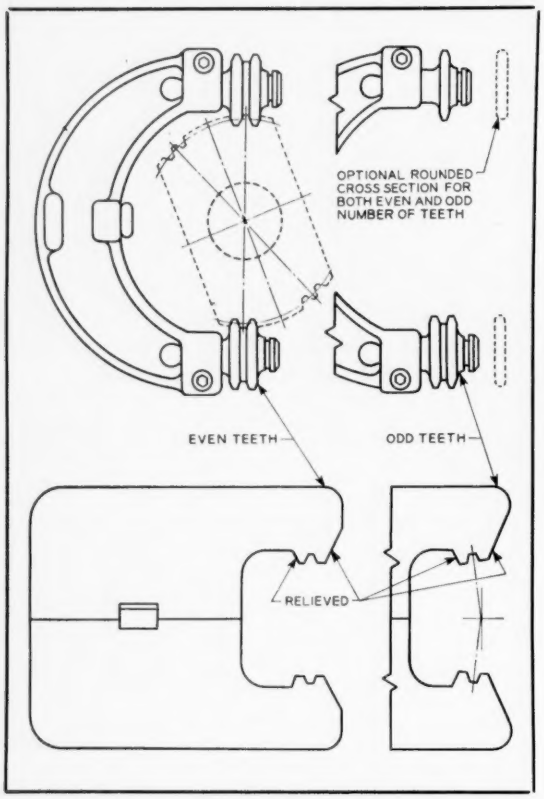


Figure 9—Not Go tooth thickness snap gage, for checking minimum dimensional tooth thickness (Fig. R10A and S 10A, Table 5, American Standard B5.31-1953).

rejections may be caused by the actual dimension not being within limits or by excessive manufacturing errors (see Gaging Standard, Section 8, V, p 8).

Control Systems C-104 and C-105 have only minor significance because they do not provide a full measure of fit control. They are described in the Gaging Standard, Section 7, p 8.

Each of the dimensions illustrated in Figures 4 and 5 is identified by a characteristic number. The same number is also used in designating the proper type of gage (see Table 1).

In the case of major diameter fit, Numbers 1 and 7 also appear at the minimum major diameter of the internal and at the maximum major diameter of the external spline, respectively, because these diameters are inspected by the same "Go" composite plug and ring gages which check the minimum effective space width and maximum effective tooth thickness.

Table No. 3 of the Gaging Standard elaborates on the information presented in Figures 4 and 5 of this article by listing, for each control system, the types of gages required for final inspection and the additional equipment which may be desired for processing reference.

In using this section of the Gaging Standard, which represents the key to the selection of proper gage types, the designer should first refer to Section 7 (Amer Std B5.31-1953, p 8) and select a suitable control system. Table 3 (page 9 of the Standard) will then permit him to find, for his application, the types of gages which should be used for each spline component.

Each type of gage is available in a number of different design combinations or variations. These design patterns are illustrated and described in Tables 4 and 5 of the Gaging Standard.

To illustrate the use of these tables, let us assume that Control System C-101A is selected for an internal spline designed for side fit. Table 3 lists gage types No. 1 and 4 as required for final inspection, No. 3 for process reference, and No. 6 as optional equipment (see footnote 4 under Table 3). Table 4 shows a selection of four gage designs, type No. 1 (page 10). A tapered gage (page 12) is, according to its design number, also applicable for type No. 1. Gages Number 1B, 1C, and L1B are excluded because they are used only for major diameter fits. If the spline is designed with full dedendum, the choice remains between 1A, L1A, and T1A2. The decision between 1A and L1A depends upon the length of engagement between mating part splines. The choice between tapered and straight gages may be narrowed by design limitations of tapered gages, which are covered in subsequent sections of the Gaging Standard (Table 15). The non-tapered gage represents a smaller investment and may be adequate. The tapered gage has the advantage of measuring as well as checking the part. It can be used to determine exactly the effective space width and its variation from part to part. This is desirable in quality control operations.

A similar choice range is available for other types of gages. The Gaging Standard introduces a numbering system which permits a complete identification of each gage design. Figures 6, 7, 8, and 9 of this article illustrate the most popular types of gages presented.

Detailed gage dimensions are required after the type of gage and a suitable design pattern are selected. The Gaging Standard covers the dimensioning of the important gaging surfaces, not the gage blank dimensions which fall within the scope of the Commercial Standard CS8-51 for "Gage Blanks."[1] Tables 6 through 15 of the Gaging Standard deal with the gage spline dimensions, tolerances, and wear allowances.

Minimum tolerances are given for space width and tooth thickness as well as pin measurements of plug and ring gages. Tolerances for major diameters of plug gages and minor diameters of ring gages depend on the fit application. The tolerance on the minor diameter of spline plug gages and the major diameter of spline ring gages is never closely controlled because it is impractical to hold sides and root of the gages simultaneously within close limits. When the major diameter must be checked by a ring gage, a plain cylindrical gaging bushing is inserted into a counterbore of the ring, as shown in the Standard for gages No. 7B, 7C, etc. This bushing serves as a ring gage to control the maximum major diameter and its concentricity with the spline teeth. The major diameter of the gage spline is made to clear the major diameter of the part spline. The same approach may be used in the rare case of a minor diameter fit by providing a check bushing on a front pilot of the "Go" composite plug gage.

In general, tolerances and wear allowance of "Go" and "Not Go" gages together should not absorb more than 10 percent of the part tolerance. This limit is desired because gage tolerances and wear allowances are applied within the part tolerance (see Figure 3 of this article) and therefore, reduce the manufacturing tolerance. The 10 percent rule, which is usually followed in general gage design practices, sometimes leads to extremely close gaging tolerances which cannot be maintained in the manufacture of spline gages. Therefore, the Gaging Standard, Section 11, permits the sum of "Go" and "Not Go" tolerances to absorb as much as 25 percent of the part tolerance. This conforms to a similar relation in the gaging of threads with close tolerances. In most cases, the gage tolerances and wear allowances shown in Tables 7 through 11 of the Gaging Standard will be within 25 percent of the part tolerance. When the tabulated gage tolerances and wear allowances exceed this limit, it may become necessary to use tapered plug gages which eliminate part tolerance absorption by the gage tolerance or to reduce the gage wear allowance. A tolerance stricter than the minimum given in Tables 7, 8, and 9 should not be specified. On the other hand, tolerance liberalization should be considered when the part tolerance is liberal enough to allow more gage tolerance.

Complete data for all functional gage dimensions are presented in tables 12 through 15 of the Gaging Standard. Figure 10 is a partial reproduction of Table 12. This table, as well as Tables 13, 14, and 15, establish a relationship between the dimension of the spline gage member and the corresponding dimension of the part spline by referring directly

[1] Issued by the U. S. Department of Commerce in cooperation with the National Bureau of Standards and obtainable from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

Figure 10—Partial reproduction of Table 12, American Standard B5.31-1953, showing formulas for plug gage dimensions. Column numbers refer to American Standard, Involute Splines, B5.15-1946.

Gage No	Major Diameter	Tol	Wear Limit	Diam. at Cham(3)	Minor Dia	TIF Dia	Tooth Thickness	Tol	Wear Limit	Measurement over Pins	Tol	Wear Limit
1 A L 1 A	Col 10	− (1)	Clears	No Cham	To (2) Clear	Col 11	(7) Col 15 + WA	Ref	Col 15 (7)	Basic + (E × WA)	+	Basic
1 AS L 1 AS	Col 5	− (1)		No Cham	To (2) Clear	Col 11	(7) Col 15 + WA	Ref	Col 15 (7)	Basic + (E × WA)	+	Basic
1 B L 1 B	Col 4 + WA	+	Col 4	Col 5	To (2) Clear	Col 11	(7) Col 15 + WA	Ref	Col 15 (7)	Basic + (E × WA)	+	Basic
Front 1 C	Col 5	(1) −		No Cham	To (2) Clear	Col 11	(7) Col 15 + WA	Ref	Col 15 (7)	Basic + (E × WA)	+	Basic
Rear	Col 4 + WA	+	Col 4	Col 5	To (2) Clear	Col 11	(7) Col 15 + WA	Ref	Col 15 (7)	Basic + (E × WA)	+	Basic
2	Col 4 − $\frac{2a}{3}$	(1) ±		No Cham	To (2) Clear	Col 11	(7) Col 15 + MT	Ref	None	Basic + (E × MT)	−	None
3 A	Col 4 − $\frac{2a}{3}$	(1) ±		No Cham	To (2) Clear	Col 11	Col 15 − MT + WA (4,8)	Ref	Col 15 − MT	Calculate	+	Calculate
4 A	Col 4 − $\frac{2a}{3}$	(1) ±		No Cham	To (2) Clear	Col 11	Col 15 (4)	Ref	None	Calculate	−	None
3 B	Col 4 − $\frac{2a}{3}$	(1) ±		No Cham	To (2) Clear	Col 11	Col 15 − MT + WA (8)	Ref	Col 15 − MT	Calculate	+	Calculate
4 B	Col 4 − $\frac{2a}{3}$	(1)		No	To (2)	Col 11	Col 15	Ref	None	Calculate	−	None

to the appropriate column of the Spline Standard. If gages are to be designed for parts which do not conform to the Spline Standard, the same gage-to-part relationship may be used.

Page 21 of the Gaging Standard also offers detailed information for the design of roller profiles and anvils used on various types of tooth thickness snap gages.

The example below illustrates the use of the gage design information presented in the Standard.

The dimensioning of this spline conforms to Control System C-101A because the minimum effective and maximum dimensional space width are given as acceptance limits, the minimum dimensional space width as a reference dimension. If Control System C-102 or C-103 were required, the maximum effective space width (0.0992) would have to be computed from the machining tolerance or error allowance given in Table 1 of the Gaging Standard.

It will be necessary to design a "Go" composite plug gage, and, unless pin measurements are used, "Go" and "Not Go" paddle gages.

GAGE DESIGN DATA FOR GAGE NO. 1A

Major Diameter — $0.8125\ ^{+0.0005}_{-0.0000}$

This dimension conforms to the true form diameter of the part spline and carries a positive tolerance because the part dimension does not allow for involute clearance. A wear limit is not required because the major circle of the gage clears the major circle of the part. For the same reason, the gage is not provided with tip chamfers.

TIF Diameter — 0.6875

This dimension is equal to the minimum minor diameter of the part spline.

Minor Diameter — to clear

Control of this dimension is not required as long as the necessary true form depth is maintained. The shape of the gage root fillet is optional and need not be specified.

Circular Tooth Thickness — $0.0982 + 0.0003 = 0.0985$ ref

A 0.0003 wear allowance is used in accordance with Table 11, Gaging Std, because part spline dimensions conform to C-101A. Control systems which require the inspection of the maximum effective space width employ a smaller wear allowance because of the reduced "Go"—"Not Go" gaging spread. The tooth thickness is marked "ref" because it cannot be measured directly.

Measurement over 0.120 diam pins — $0.9331 + 0.0003 \times 1.44 = 0.9335\ ^{+0.0002}_{-0.0000}$

The basic pin measurement and Factor E are found in Tables 29 and 4 respectively of the Spline Std, the tolerance on the pin measurement in Table 9 of the Gaging Std. The 0.0001 tooth thickness tolerance shown in Table 7, Gaging Std, would conform to 0.00014 tolerance on pin measurement which is increased to 0.0002 in accordance with Section 11B, Gaging Std.

Wear Limit Pin Measurement — 0.9331

This is the basic dimension shown in Table 29, Spline Std.

Our example above illustrates the design of gage No. 1A which is a "Go" composite side fit plug for full dedendum. This gage is selected because it is assumed that the spline is short and that the gage is required for acceptance inspection rather than quality control.

PART SPLINE DATA, INTERNAL

12 teeth
16/32 diametral pitch
30 deg pressure angle
0.7500 pitch diam
0.6495 base circle
Tooth side fit,
Class A
Full dedendum

Major diam (Col 9A, Spline Std) ..... 0.8402 / 0.8290

TIF diam (Col 10, Spline Std) 0.8125
This dimension does not allow for involute clearance since the maximum major diameter of the external spline (Col 24) is the same

Minor diam (Col 6 or 11, Spline Std) ..... 0.6900 / 0.6875

Minimum Effective Space Width 0.0982
(Col 15, Heading, Spline Std)

Minimum dimensional space width ..... 0.0997 ref
This dimension may be found
either
by subtracting the 0.001 machining tolerance shown in Table 1, Gaging Std, from the maximum dimensional space width
or
by adding the 0.0001 (0.072N + 14) = 0.0015 error allowance of Table 1, Gaging Std, to the minimum effective space width

Maximum dimensional space width 0.1007
(Col 15, Spline Std)

In computing pin measurements for spline plug gages, the same standard pins are used as in the Spline Standard, the diameter of which is $\frac{1.92}{DP}$ (Note: DP = diametral pitch). Measuring pins for ring gages have $\frac{1.728}{DP}$ rather than the $\frac{1.44}{DP}$ diameter used in the Spline Standard. The $\frac{1.44}{DP}$ diameter is less than a basic space width and would cause the pin to contact substantially beyond the pitch diameter, which in turn would require either the use of flatted pins or the increase of the major diameter of the ring gage. Neither alternative is desirable in gage manufacturing operations. For this reason the 1.728 pin series was selected for spline ring gages. Table 2 of the Gaging Standard presents basic measurements between pins for the 1.728 series and corresponding change factors "F."

Audiometers Test Hearing Acuity

by Hallowell Davis

Director of Research, Central Institute for the Deaf

AN audiometer is an instrument to measure hearing; but there are many ways in which hearing can be measured, and several different kinds of electronic audiometers have been developed for different purposes.

Among these purposes are, first, to determine whether or not a patient has a hearing loss and, if so, how much and at what frequencies. These measurements of the sensitivity of hearing, known as an "audiogram," also serve for reference to determine later whether the loss is diminishing or increasing.

Then there is medical diagnosis, in which the doctor uses the results of audiometry in addition to inspection, medical history, and other tests, to determine the type, the probable cause, and the future prospects of a given hearing loss. The diagnosis may even point to a condition outside the ear, such as an early brain tumor.

Sometimes audiometry is done simply to separate individuals into two groups, one with hearing that is normal (or near enough normal to require no special attention) and the other requiring further test or other attention. Such "screening" is now done regularly in many school systems. Induction into military service presents rather similar problems.

For these purposes and particularly for medical diagnosis, the pure-tone audiometer, which presents to the listener a series of tones of known frequency and intensity, has been considered the instrument of choice.

A different objective is to measure how well a person hears speech, not just simple pure tones. This information may help in the medical and psychological understanding of certain cases. There are a few disorders of the ear and of the brain, including some changes associated with old age, in which the ability to hear speech correctly is not related in the usual way to the ability to hear faint pure tones, although in most cases it is possible to predict quite accurately the ability to hear speech from the measurements made with a pure-tone audiometer. Furthermore, in the typical medico-legal situation the ability to hear the spoken word and carry on a two-way conversation is generally recognized as the predominant "ability" of hearing and it may be important to measure or demonstrate this ability directly.

Several diagnostic tests of hearing are based on the ability of a listener correctly to repeat or write down words or sentences delivered to him at known acoustic levels.

Speech tests can be used for screening, as well as for diagnostic purposes.[1] For many years a speech test consisting of recorded lists of numbers has been widely used in schools as a group screening test. To standardize these tests of hearing, it is necessary to specify the test material, *i.e.*, the words or sentences, their manner of presentation, the acoustic levels to be employed, etc, and also the apparatus to be employed for the presentation.

The advantages of standardization of all types of audiometers to the doctor, to the school administrator, and to the person whose hearing is defective should be obvious. The doctor, for example, can compare the

[1] The term "for diagnostic purposes" refers to tests given to a single individual to determine his degree of hearing loss. "Screening" refers to rapid approximate testing simultaneously of large groups of people.

Industrial noise is rapidly becoming major employer-employee problem. Here, plant nurse uses audiometer to test employee's hearing.

Sonotone Corp

Dr Davis was chairman of the Writing Group that prepared the American Standard Specifications for Speech Audiometers, Z24.13-1953, Audiometers for Diagnostic Purposes, Z24.5-1951, and Pure-Tone Audiometers for Screening Purposes, Z24.12-1952. He is member-at-large on the parent group—Sectional Committee Z24 on Acoustics, Vibration, and Mechanical Shock, sponsored by the Acoustical Society of America.

results of his own test with an audiogram made several years ago by another doctor in a distant city.

The medical profession, through the Council on Physical Medicine and Rehabilitation of the American Medical Association, actually pioneered in the standardization of audiometers by setting up certain "minimal requirements for acceptance" of pure-tone audiometers for diagnostic purposes. These requirements insured both accuracy of frequency and of sound-pressure output and also standardization of what should be considered normal acuity of hearing.

The same organization also set up minimal requirements for a simpler pure-tone audiometer for screening purposes, and also for speech audiometers (for diagnostic purposes).

All three of these standards have now been given the powerful additional support and authority of the American Standards Association by being incorporated into a series of corresponding American Standards.

The first of these, Z24.5, for pure-tone audiometers for diagnostic purposes was issued in 1951. Two more, Z24.12, for pure-tone audiometers for screening purposes and Z24.13 for speech audiometers for diagnostic purposes, have appeared in 1952 and 1953, respectively.

The first two standards specify the performance of pure-tone instruments. They state what frequencies should be provided and within what tolerances, the range of sound-pressure output, the steps of intensity, and the tolerances that are required. They tell how these sound pressures are to be measured, and what degree of impurity of the test tones, how much background noise, and how much interference from switching transients are permissible. The standard for speech audiometers calls for what is essentially a high-quality sound-reproducing system, but with headphone receivers instead of a loudspeaker and a carefully calibrated gain control, to play samples of speech that have been recorded on either phonograph discs or magnetic tape. This standard deals only with the apparatus for delivering speech tests to the listener, with the general objectives (*a*) that the speech sounds that reach the listener's ear shall be a faithful reproduction, within specified limits of tolerance, of the original spoken or recorded material, and (*b*) that the sound-pressure levels at which the speech sounds reach the listener's ear shall be known and controllable within specified limits. With such apparatus and employing appropriate spoken or recorded material, it is possible to determine both the "hearing loss for speech" and the "discrimination loss for speech."

The task of standardizing audiometers is by no means at an end, however. The arts of sound measurement and of sound reproduction, like the art (and science) of the measurement of hearing did not stand still while the compromises in these standards were worked out to the mutual satisfaction of scientists, of users, and of manufacturers. Actually the 1952 American Standard for Pure-Tone Audiometers for Screening Purposes is more detailed and more advanced in several respects than the older (1951) American Standard for Pure-Tone Audiometers for Diagnostic Purposes, although the diagnostic instrument is actually the more elaborate and versatile instrument. But American Standards are reviewed periodically, and it is generally agreed that within a very few years it will be time to rewrite these three audiometer standards and combine them in a single unified document.

By that time it should be possible to extend the unification still more broadly. For example, the apparatus specified for the measurement of the sound pressures produced by a pure-tone audiometer is not quite identical with the corresponding equipment specified in another American Standard (Coupler Calibration of Earphones, Z24.9-1949). This situation is admittedly unsatisfactory at the present time, because the American Standards Association is not self-consistent. It recognizes two acoustic couplers that are not quite the same and which differ for historical rather than for scientific reasons.

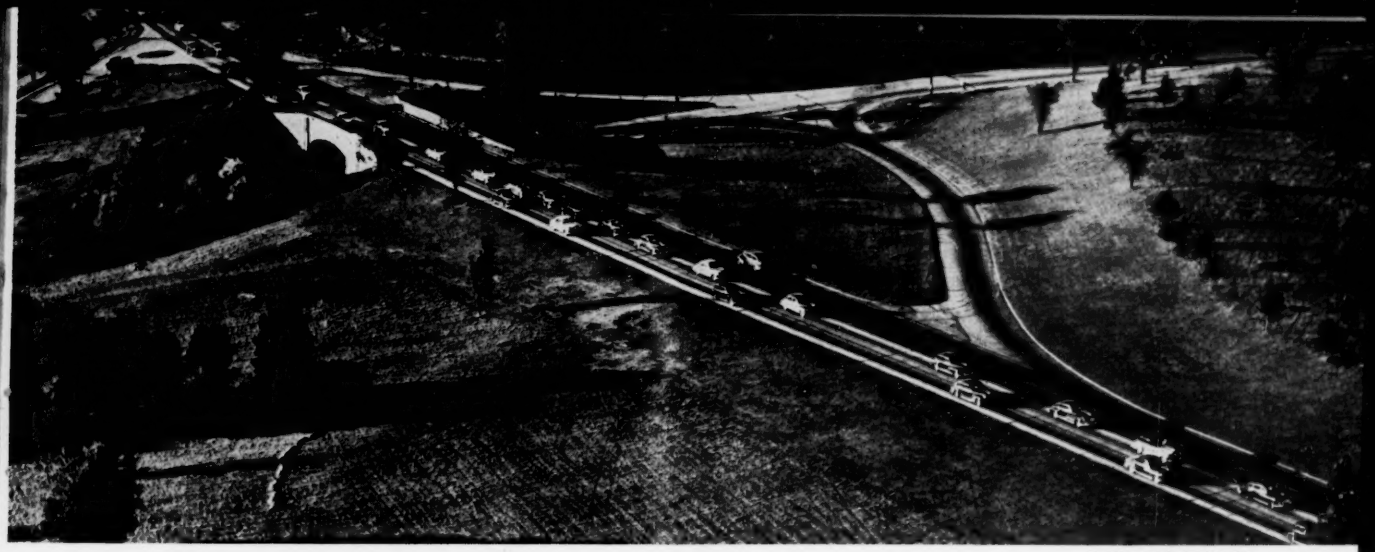
Research that is now going on in the National Bureau of Standards and elsewhere should soon make clear whether it is more desirable to adopt the present standard piece of equipment for calibrating all earphones or, possibly, for some very good and clearly recognized reason, to provide specialized equipment to be used in calibrating audiometers for different purposes, or finally to adopt a single improved coupler for all purposes.

The question has also been raised whether the present threshold values that define "normal" hearing are accurate and satisfactory. The present values are based on a study made in 1935-36 by the National Health Survey. The average response of a large number of individuals between 18 and 30 years of age was taken as the "normal threshold of audibility." But when more carefully selected groups of subjects are tested with present audiometers and in really quiet test rooms the "normal" standard seems to be too lenient. It is hoped that within the next few years agreement can be reached not only on an American Standard for normal hearing but on an international standard.

The standard for speech audiometers tells what apparatus is needed to reproduce speech faithfully at known intensities, but the actual recordings to be used with it have not yet been standardized. It should be possible soon to agree on certain physical and engineering specifications of the recording, such as size and speed of disc or tape, size of groove, presence and character of calibrating signals, frequency response characteristics of the recording apparatus, and so on.

More remote is the possibility of specifying in objective physical terms a standard sample of American speech. Speech is a variable, statistical affair and we cannot measure its intelligibility by physical methods alone. There will be confusion until some standard samples of recorded speech have been chosen arbitrarily and preserved as standards of comparison and reference, just as the actual headphones used in the National Health Survey have been kept

(*Continued on page* 255)



Standard Oil Co (N. J.)

International Signs for World's Traffic

by H. E. Hilts

Deputy Commissioner, U. S. Bureau of Public Roads

AS the world shrinks under the impact of improved communications and rapid transport, another of those quaint international differences that have made foreign travel interesting—and sometimes difficult—may soon be on its way to extinction. The roadside traffic signs that have contributed local color to the foreign landscape are now threatened with an unromantic but very practical standardization under the auspices of the United Nations.

Both the safety and the efficiency of highway traffic depend on the prompt and automatic recognition of familiar traffic-control devices. Where national standardization was once our goal, we now think in terms of world-wide uniformity. National boundaries, in the free areas of the globe, are no barriers to highway traffic where modern roads exist. Oceans will always restrict the intercontinental movement of vehicles, but more and more travelers are discovering the conveniences of acquiring motor vehicles for their personal use while abroad.

The standardization of highway signs has a history of a little more than a quarter of a century, but it is only in the past several years that it has become a truly global concept. Through the 1926 Convention Relative to Motor Traffic and the 1931 Convention on Road Signals, the countries of Europe and much of the colonial world achieved some degree of basic uniformity, though with many local variations. Similarly in this country national standards were first established in 1925 by the American Association of State Highway Officials. The *Manual on Uniform Traffic Control Devices* (American Standard D6.1-1948) has been closely adhered to by all the States. This standard is now jointly sponsored by the American Association of State Highway Officials, the Institute of Traffic Engineers, and the National Committee on Uniform Traffic Laws and Ordinances. (It was first approved in 1935 as an American Standard.) It has also found growing acceptance not only in Canada and Mexico but in many Central and South American countries as well. It has been periodically revised and brought up to date, the current edition being dated 1948.

Unfortunately these two independently developed standards for uniformity, the European and the American, have little in common. In our country, with a single language and almost universal literacy, many sign messages can be effectively spelled out in words. Under the European system the objective has been to use symbols, either pictorial or abstract, that can speak the same language everywhere. Danger warning signs in the European scheme are triangular. In America they are "diamond"-shaped. European regulatory signs are round; ours are rectangular. European warning and regulatory signs have wide colored borders, whereas our warning signs are yellow and our regulatory signs white, with messages or symbols in black.

In 1949 the United Nations held a Conference on Road and Motor

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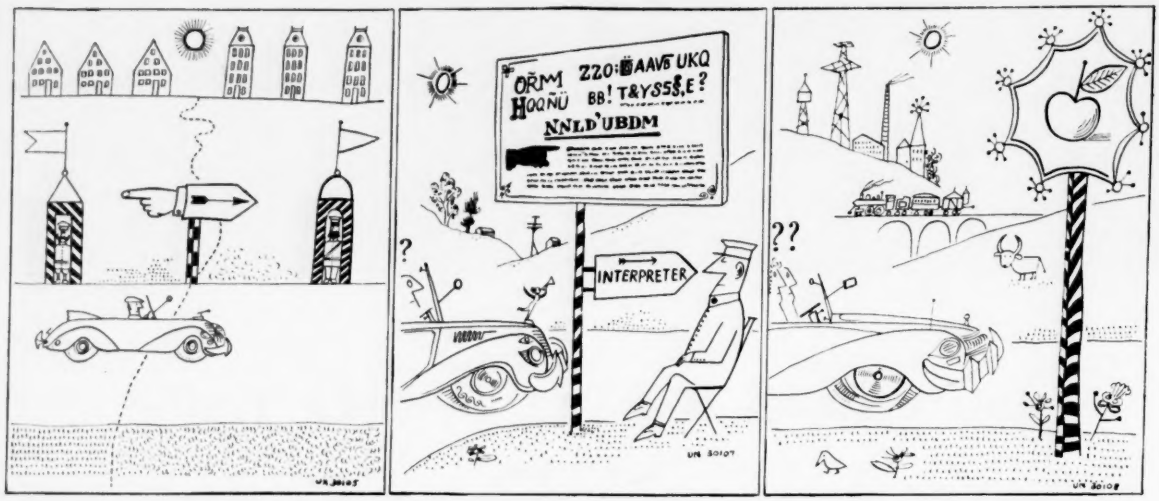
Mr Hilts is Deputy Commissioner, Bureau of Public Roads, Department of Commerce, Washington, D. C. He was one of the six members of the United Nations "Group of Experts" that drafted the 1953 Protocol on road signs and signals. He is also well acquainted with the work on road signs done in the United States, having served as chairman of the Joint Committee on Uniform Traffic Control Devices that developed the American Standard Manual on Uniform Traffic Control Devices, D6.1-1948. Mr Hilts has been a member of the Highway Traffic Standards Board of the American Standards Association for the past ten years.

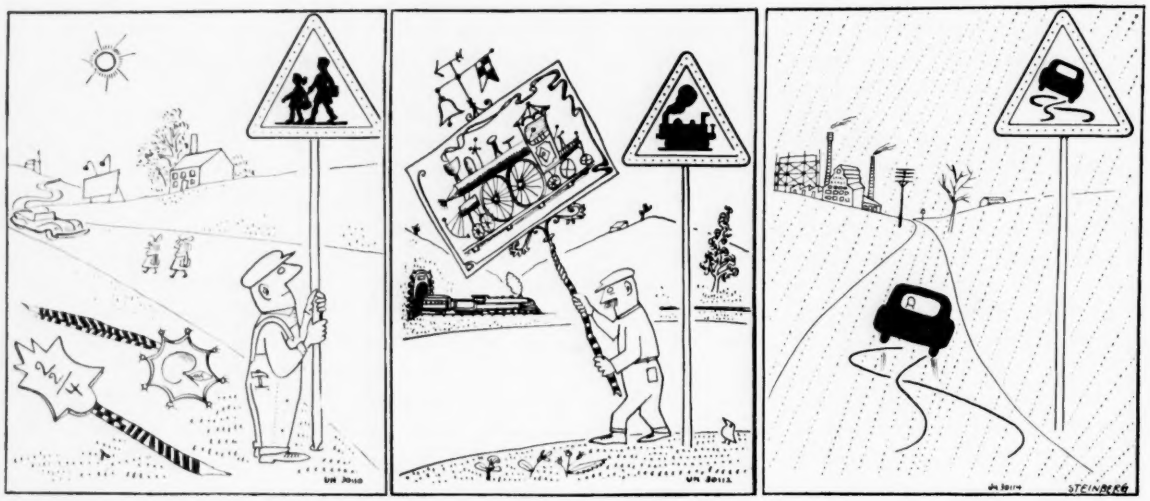
NEW INTERNATIONAL SIGNS

AND THEIR EFFECT ON MOTOR TRAVEL

Excerpts (as seen by cartoonist Steinberg) from "Mr Smith Goes Abroad," issued by the United Nations Department of Public Information.



The touring motorist who finds himself abroad . . . confronted with unfamiliar language . . and bewildering signposts . . .



will soon find a simplified . . . and standardized . . . directional . . . and danger signal system . . .

Some of the UN Pictorial Road Signs

How international signs compare with corresponding American Standard signs. Top and third rows—International; second and bottom—American Standard.

Transport, attended by representatives of 28 nations, for the purpose of drafting a new convention to facilitate international traffic. Along with such matters as the setting of minimum standards for the reciprocal recognition of vehicle registrations and driver licenses, and the establishment of basic rules of the road, it was expected that agreement could be reached on a uniform scheme of traffic signs, signals, and markings for universal use. Faced with the fact that there were two major systems of standard signs in current use, neither of which could be acceptable to the adherents of the other, the conference, after rejecting the idea of offering two alternate standards, recommended that the Transport and Communications Commission of the United Nations should make a further study of the possibility of developing a single uniform system. Meanwhile it suggested that all countries refrain from any commitments that might make future agreement more difficult.

Accordingly, the Transport and Communications Commission in 1950 appointed a "Group of Experts on Road Signs and Signals," having one representative from each of the six major continental areas of the world. These experts met for three sessions in 1950, 1951, and 1952, each of several weeks duration. The first session was devoted largely to a survey of existing systems of road signs and signals and an exploration of the possible areas of compromise. It was immediately apparent that there were few data on which to base a scientific selection of color, shape, or symbolization. Both the European and the American systems had a long history of successful use. A partial synthesis of the two systems adopted in 1949 by the Central and Southern Africa Transport Conference, in Johannesburg, had hardly had time to prove itself in extensive use. It was accordingly decided that during the period between the first and second sessions each member of the group would carry out a series of visibility and legibility tests on a selected set of alternative designs for warning signs. Four standard European warning signs were chosen, together with their counterparts in standard American and the standard Central and Southern African designs. Each design was duplicated in both European and American colors.

These 24 signs were tested under actual driving conditions at 50 miles per hour, and with a wide variety of weather, lighting, and roadside backgrounds. Inevitably the tests showed the superior legibility of symbols as compared with "inscriptions." Yellow signs with black symbols seemed best by a small margin, and the most effective symbols were those of bold

design, distinctive outline, and substantial area.

Between its second and third sessions, the members of the group independently experimented in the symbolizing of regulatory signs and in the development of certain warning symbols on which agreement had not previously been reached. The specific and detailed nature of many traffic regulations limits the extent to which symbols alone can be counted on to convey complete messages, and the experiments, in this country at least, indicated that there would ordinarily be a need for a word-message to supplement the symbol.

At its third and last session, the Group of Experts was able to agree on a proposed "Convention on a Uniform System of Road Signs and Signals," which it offered to the United Nations Transport and Communications Commission as a part of its final report, with a recommendation that it be adopted by all countries.

For danger warning signs the convention proposes the yellow background of the present American Standard. Sign shapes are given three options to permit the use of the European triangle, the American diamond, or the Central and South African triangle-diamond combination. For various types of danger the convention proposes about 30 symbols, all of a pictorial or diagrammatic type. The symbols for curves and intersections were taken directly out of the American Standard Manual on Uniform Traffic Control Devices, and the other symbols, if not all immediately self-explanatory, should be easy to understand. Thus many American warning signs are already in complete accord with the proposed United Nations standard. For perhaps a dozen of our present word-message signs the convention would call for a substitution of symbols. Where no symbol is proposed, word messages would continue to be used.

The illustration on page 241 shows a number of the proposed United Nations warning signs each compared with the corresponding sign in the current American Standard. Doubtless some of the symbols can be improved in details, and the convention provides reasonable latitude for this in requiring only that modification "shall be such as not to alter the essential character of the symbols."

For regulatory signs the Group of Experts adopted the basic symbol of a ring or disc. The signs, therefore, may be either the European type of disc with a substantial border enclosing a symbol, or a rectangular plate surmounted by or including a disc, the symbol being within or below the disc. While the color of the ring is not prescribed, it may be assumed that the adherents of the present European system would continue to use red while others might use black to avoid the cost of a three-color design. If the sign expresses a prohibition, the proposed United Nations scheme calls for an oblique bar across the disc, "striking out" a symbol that represents the prohibited action or the excluded type of traffic, as the case may be. The illustration on page 241 shows several regulatory signs, both restrictive and prohibitory, as they might be designed for American use, together with the comparable signs in the present American Standard. Actually the symbols alone would convey the message in the international code.

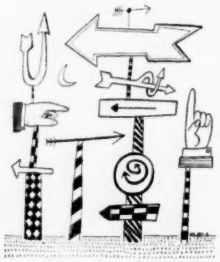
Because the most extensive use of the "STOP" sign has been in this country, and because the American sign is distinctive and effective, the Group of Experts agreed on the yellow octagon for this sign, with the word "STOP" or its equivalent in the local language. This was the only sign for which a word message was recommended, but it was further symbolized by a heavy black horizontal bar crossed by a shorter, narrow vertical bar, diagrammatically representing the intersection of a major by a minor road. The word "STOP" is centered in the horizontal bar. The proposed new design is shown with the old in the illustration on page 241.

Little difficulty was found in setting up general standards for directional and informational signs. As these are used only for guidance, detailed uniformity is less essential than for the other classes of signs.

Traffic light signals are already more or less standardized throughout the world, at least as to colors, and while the proposed international specifications are less exacting than those in the American Standard there is no serious inconsistency. In the case of pavement striping, the relatively limited use of such markings outside this country made it easy to propose the basic elements of the American Standard for international use.

Because of large national investments in signs and in the training of drivers to recognize and obey them, the Group of Experts did not set a deadline for a changeover to the new standards. Instead, the proposed convention simply provides that the new system is to be applied "as soon as practical, and gradually if necessary." The convention would enter into force fifteen months after its ratification by any five countries, and for additional countries fifteen months after its ratification by each. A suitable procedure is set up for the making of future amendments.

The proposed convention has been approved by the Transport and Communications Commission of the United Nations, with the recommendation that it be submitted to the member nations for ratification in its present form. The United Nations Economic and Social Council, however, with which the final decision rests, has postponed action for another year, during which time the Secretary-General will ascertain from the several nations whether they are ready to ratify the document as it stands, or whether it should first be considered by an international conference called for the purpose.



Active Work on Power Switchgear

by V. L. Cox

THE Sectional Committee on Power Switchgear, C37, now has under way an active program. It is revising the American Standards for Alternating-Current Power Circuit Breakers that have already been approved, and is developing a number of new standards. Now being actively revised are the six standards approved in 1945 and bound together in one volume. These are identified as C37.4 through C37.9. They cover alternating-current power circuit breakers, C37.4-1945; method of determination of rms values, C37.5-1945; tables of preferred power circuit breaker ratings, C37.6-1945; standard operating duty for reclosing service, C37.7-1945; standard rated control voltages and their ranges, C37.8-1945; and test code for power circuit breakers, C37.9-1945.

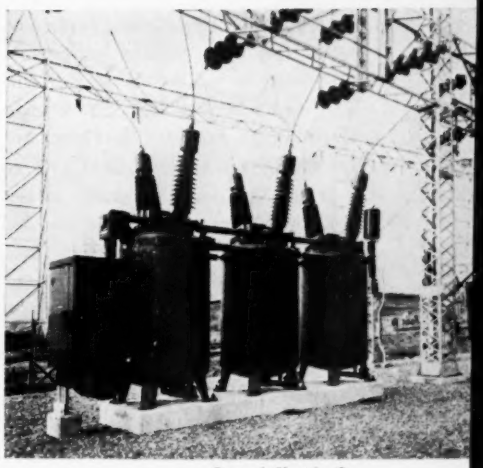
Although these standards were issued as a single bound volume, as new standards are completed and become available they will be issued individually. A binder, fastened with screws and fashioned so that new material can be included, is being made available for them. It will be large enough to take the entire series as new editions become available.

Now published are 1952 revisions of two of the 1945 standards, and an entirely new standard that provides a guide for application of the standards on alternating-current power circuit breakers. The revisions provide up-to-date editions of the American Standard for Operating Duty (Duty Cycle) for Standard and Reclosing Service Applicable to Oil Circuit Breakers, C37.7-1945, and of the American Standard Rated Control Voltages, C37.8-1945.

American Standard C37.7-1952, now entitled American Standard Interrupting Rating Factors for Reclosing Service on Power Circuit Breakers, applies both to oil and oilless types of power circuit breakers. For oil-tight and oilless breakers a new system for determining the "rating factors" has been included. For the most usual duty cycles for reclosing service, the rating factors may be read directly from a curve. For unusual reclosing duty cycles, a method is included in the revised section for determining the applicable rating factors. The "rating factors" included in the revised standard are much more liberal than those included in the previous edition. The material for this revised section was prepared by the EEI-AEIC-NEMA Joint Committee on Power Circuit Breakers.[1]

American Standard C37.8-1952, now entitled Rated Control Voltages and Their Ranges for Power Circuit Breakers, includes as the principal modification (1) a change from 110 and 220 to 115 and 230 volts as the rated control voltages, in line with modern practice; and (2) a provision for cases where operating mechanisms are not designed to meet all the closing requirements over the full range of specified control voltages. For these cases, the user will be called upon to designate which of two voltage ranges is required. This material was also prepared by the EEI-AEIC-NEMA Joint Committee on Power Circuit Breakers.

American Standard C37.12-1952, Guide Specifications for Alternating Current Power Circuit Breakers, is new. It was prepared by the AEIC Committee on Electric Switching and Switchgear and subsequently approved by the Electrical Equipment Committee of EEI and the EEI-AEIC-NEMA Joint Committee on Power Circuit Breakers. It has been approved by Sectional Committee C37 and by ASA on recommendation of the committee. Primarily, these specifications are intended as a reference for purchasers and users of circuit breakers in the preparation of requests for quotations and as a reference for manufacturers in submitting bids.



General Electric Co

Outdoor oil circuit breakers in operation at the Possum Point Station of the Virginia Electric & Power Company.

Other American Standards now under active revision by the sectional committee are: C37.4-1945, Alternating Current Power Circuit Breakers; C37.5-1945, Methods for Determining the Rms Value of a Sinusoidal Current Wave and a Normal-Frequency Recovery Voltage; C37.6-1949, Schedule of Preferred Ratings for Power Circuit Breakers; C37.9-1945, Test Code for Power Circuit Breakers. The committee is also giving consideration to adding an appendix entitled "Simplified Calculation of Fault Currents" which can be used by application engineers for the usual case of circuit breaker application.

The committee is now considering the preparation of an American Standard on Low Voltage Air Circuit Breakers. Material has been prepared by the AIEE Switchgear Committee. This consists of AIEE standard 20 and Application Guide, together with a recently prepared Test Code. When agreed upon by Sectional Committee C37, this standard will cover all air circuit breakers with

Mr Cox, Switchgear Divisions, Apparatus Department, General Electric Company, Philadelphia, is chairman of Sectional Committee C37 on Power Switchgear.

[1] Edison Electric Institute-Association of Edison Illuminating Companies-National Electrical Manufacturers Association.

interrupting ratings over 10,000 amperes and with voltage ratings of 1500 volts or less for a-c service and 3000 volts or less for d-c service. Molded case breakers, however, are specifically not covered.

Other American Standards in the C37 series are current and are not the subject of revision at this time. These are the American Standard for Relays Associated with Electric Power Apparatus, C37.1-1950, and the American Standard Automatic Station Control, Supervisory and Telemetering Equipment, C37.2-1945. They were published as individual standards at the time they were approved, and can be obtained from ASA.

It is recognized that the purchaser of any of the new editions in the C37 series must have the information contained in the other standards in the series in order to use the new standards intelligently. For that reason a special arrangement has been made. Anyone buying one of the new standards will be entitled to purchase the earlier standards at a greatly reduced rate. (See box on this page.)

The membership of the Sectional Committee on Power Switchgear, C37, consists of a wide cross-section of users and manufacturers of products within the scope of the committee. Members are representatives of the American Institute of Electrical Engineers, Association of American Railroads, Association of Iron and Steel Engineers, Electric Light and Power Group, National Electrical Manufacturers Association, Tennessee Valley Authority, Department of the Army, Department of the Navy, and the Department of Interior.

Copies of revised editions of the standards on power switchgear can be obtained individually at the following single-copy prices:

C37.6-1949	$0.35
C37.7-1952	$0.30
C37.8-1952	$0.30
C37.12-1952	$0.60

Anyone who needs copies of the earlier editions can obtain them, plus the new standards listed above, at $2.25 for the entire set.

REPORTS SHOW REFRIGERATION CODE WIDELY USED

REFRIGERATION equipment manufactured to conform with the safety provisions of the American Standard Safety Code for Mechanical Refrigeration, B9.1, can now be installed in 850 governmental jurisdictions without special alterations to conform with local ordinances.

The B9 safety code has been adopted either outright by these cities, counties, and states or as incorporated in the model codes of other organizations. Universal adoption of the code will not only help to eliminate unnecessary costs of specially built equipment but will assure the adequate safeguarding of persons and property in commercial and residential occupancies, particularly in apartment houses, reports indicate.

The figure for the nationwide use of this American Standard was reported by the Refrigeration Industry Safety Advisory Committee (RISAC) following a recent survey. Myron D. Miller, executive secretary of RISAC, stated that this growth in the use of the code can be credited largely to the trend of establishing model codes, many of which incorporate the safety recommendations of B9.

The Basic Building Code of the Building Officials Conference of America, for example, was established in 1950. It has been adopted by a number of cities, thereby establishing the B9 Safety Code, a part of the BOCA code, as the required provisions for those cities. The National Board of Fire Underwriters has two codes, both of which utilize the B9 code and have been adopted by many cities. These are the National Building Code, governing air conditioning, and the Fire Prevention Code, governing all refrigeration installations.

Three hundred cities, the committee states, have adopted the optional refrigeration provisions of the Uniform Building Code of the Pacific Coast Building Officials Conference, which are based on the B9 standard.

Because the code is so widely accepted throughout the country, most manufacturers are meeting the minimum standards of the code in the manufacture of their equipment. Consequently, cities that have provisions for mechanical refrigeration which differ from the code may require the alteration of equipment before it is installed.

Object of the code is the protection of occupants of residential, commercial, industrial, and public buildings from accidents or fire resulting from the operation of refrigerators or refrigerating machinery. It was first developed in 1930, went through several subsequent revisions, the latest in 1950, and is currently in process of revision.

Original impetus for the establishment of safety rules for mechanical refrigeration came following the increased use of chemicals as refrigerants. Safety authorities demanded that safety rules be adopted to govern all mechanical refrigeration systems. Manufacturers were concerned lest a variety of safety rules throughout the country place unnecessary restrictions on their operations. They sought the development of uniform safety rules that could be adopted by all states and thus eliminate the possibility of undue increase in the cost of refrigeration systems to the users.

Through the procedures of the American Standards Association, representatives of national groups concerned were brought together to set up the code. These included groups concerned with the production of mechanical refrigeration equipment and manufacture of refrigerants, government, safety, and insurance groups, and representatives of users.

The code's requirements apply only to the occupancy classifications listed, and the requirements differ for the various types of refrigerants as the need varies for the different occupancies.

V. G. Grey

GREY JOINS STAFF OF ASA

V. G. Grey became a full-time engineer on the American Standards Association's staff in June 1953. Mr Grey is working on miscellaneous projects and is assisting Dr John Gaillard with work in mechanical engineering.

Mr Grey has been working as a part-time engineer on the ASA staff since April 1952 while completing his work toward the degree of Master of Science in Mechanical Engineering at Columbia University.

Mr Grey's previous experience has been with the U. S. Merchant Marine. He was appointed to the Merchant Marine Cadet Corps in 1946, following his graduation from Xavier High School in New York. After a year's training in fundamental principles of marine engineering at the Cadet Basic School in San Mateo, California, he studied engine room operation and maintenance at first hand on board merchant vessels. This training afloat took him to 15 countries. Two years of advanced training at the U. S. Merchant Marine Academy at Kings Point, New York, followed. He was graduated in 1950 with a commission of Ensign, USNR, Ensign, USMS, and Bachelor of Science. He also passed the examinations for a license as Third Assistant Engineer in both Steam and Diesel merchant vessels of any horsepower on any ocean. This license he later raised to Second Assistant Engineer. As licensed engineer Mr Grey returned to the sea, sailing for the American Export Lines. In February 1952 he left the sea to do graduate work at Columbia University. He received the degree of Master of Science in Mechanical Engineering in June 1953.

The Control Chart Method of STATISTICAL QUALITY CONTROL

STILL AVAILABLE

The three standard authorities for use of the control chart—

The American War Standards Guide for Quality Control, Z1.1-1941 Control Chart Method of Analyzing Data, Z1.2-1941	In One Volume $1.00
Control Chart Method of Controlling Quality During Production, Z1.3-1942	$1.00

These two volumes contain the information and instructions you need to set up a control chart and keep a continuous check on your product as it moves through production. This is the method that has saved many companies thousands of dollars. This continuous check on quality makes it possible to correct deviations on the production line and prevent waste of time and materials.

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Thirty-Eighth National Conference on Weights and Measures

The Thirty-Eighth National Conference on Weights and Measures, May 19-22, adopted a Model Regulation on Package Marking Requirements, patterned after the Federal Food, Drug, and Cosmetic Act. It also recommended methods of sale of anhydrous ammonia and other liquid chemical fertilizers with pressure characteristics; pre-heated fuel oils; peat moss in package form; rope; seeds (agricultural, horticultural, and floricultural); and pickles and pickle products in package form.

A tentative code for farm milk tanks offered by the Conference Committee on Specifications and Tolerances was adopted.

These codes and amendments are incorporated into National Bureau of Standards Handbook 44, *Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices*, and are recommended by NBS for official adoption by the states. During the Conference it was announced that 26 states had officially adopted the Handbook codes and that many other states are applying the provisions of the codes in their enforcement procedures.

During the four-day meeting of the Conference, which was organized in 1905, formal presentations were given on such topics as prepackaged foods, flour weights, automatic packaging machinery, livestock weighing supervision, electronic scales, and technicalities in weights and measures court cases.

Attendance at the Thirty-Eighth National Conference of Weights and Measures exceeded that of all previous meetings of the Conference. The 430 delegates represented many cities and counties, the Federal Government, manufacturers, railroads, business, industry, and trade associations, in addition to 39 states and the District of Columbia. The Conference is sponsored by the National Bureau of Standards.

New Water Value Causes Changes in Standards

REVISIONS to methods for viscosity determinations and tables of values for viscosity have been completed following the adoption of the new value for the viscosity of water, the American Society for Testing Materials reports.

The National Bureau of Standards announced adoption of the new value effective July 1, 1953 (STANDARDIZATION, July, page 215). In terms of kinematic viscosity, the value is 1.0038 centistokes at 68 F in place of 1.0070 centistokes at 68 F, the value formerly in use. In terms of absolute viscosity, the value is 0.01002 poise in place of 0.01005 poise.

The American Society for Testing Materials announces that its Committee D-2 on Petroleum Products and Lubricants has prepared the necessary revisions to the viscosity standards, three of which have been approved as American Standard. The new editions of ASTM D445, D446, D666, and D567, will be included in the 1953 Supplement to the Book of ASTM Standards, Part 5. In addition, the tables for kinematic viscosity conversions and viscosity index calculations in these standards have been revised and expanded. These tables are now available in a separate publication (ASTM Viscosity Tables for Kinematic Viscosity Conversions and Viscosity Index Calculations, ASTM Special Technical Publication No. 43A). The five tables included in this publication[1] provide a convenient means for viscosity conversions and for obtaining basic values for calculations of Viscosity Index. The Viscosity Index Tables (ASTM Special Publication 42) remain as they were, with no change.

All kinematic viscosity measurements have been reduced by 0.318 percent as a result of adoption of the new standard value. Recalibration of viscometers used for measuring kinematic viscosity has been required. Saybolt Universal and Furol Viscosities, however, are not affected.

The table of basic kinematic viscosity values for computing Viscosity Index, found in ASTM Method D567, has been revised so that the Viscosity Index of a given oil will not change because of the adoption of the new standard value for water. The table of basic Saybolt viscosity values for computing Viscosity Index remains as it was before.

All kinematic viscometers in use will require restandardization or recalibration. Kinematic viscometers which have C-constants that are not simple numbers (*i.e.*, 0.1, 0.3, 0.5, etc) may be restandardized or recalibrated merely by multiplying their present factors by 0.99682 (or $\frac{1.0038}{1.0070}$). However, a more complicated procedure will be required where the C-constants are simple numbers, since the physical dimensions control the value of C and any one or all of the dimensions may have to be adjusted if it is desired to retain the simple number C-constant.

The value of secondary standard oils in use by laboratories will also have to be reduced by 0.318 percent. The National Bureau of Standards revised the values of the viscosity standard oils it distributed as of July 1, 1953. In addition, the American Petroleum Institute viscosity standard oils, Alpha, Beta and Gamma, had their viscosity values revised as of the same date. Any standards on hand received prior to July 1, 1953 should have the values on the labels reduced by 0.318 percent to conform to the adopted value.

In summary, then, the following was established as of July 1, 1953:

1. The kinematic viscosity of water at 68 F is 1.0038 centistokes.
2. All kinematic viscosities are reduced by 0.318 percent.
3. All kinematic viscometers require restandardization or recalibration.
4. No changes are required in Saybolt viscosities or viscometers.
5. Conversion tables showing kinematic viscosity to Saybolt Universal and Furol Viscosities are invalidated. Corrected tables are available at ASTM headquarters.
6. Present basic kinematic viscosity values for computing Viscosity Indices are invalidated. Corrected tables may be obtained from ASTM headquarters.
7. All Secondary Standard Viscosity oils require restandardization. Further information can be obtained from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa.

[1] Conversion of Kinematic Viscosity to Saybolt Universal Viscosity, Table I; Conversion of Kinematic Viscosity to Saybolt Furol Viscosity at 122 F, Table II; Basic Values for Calculating Viscosity Index from Kinematic Viscosity, Table III; Values for Calculating Viscosity Index from Saybolt Universal Viscosity, Table IV; Factors for Converting Kinematic Viscosity to Saybolt Universal Viscosity at Temperatures from —100 to +500 F, Table V.

Standardization — Aid to Increased Production

Reprinted from *Steel Facts*, No. 120, June 1953, page 6.

Enlargements of plant and equipment constitute only one of a number of ways in which steel companies add to their ability to turn out finished products. A few years ago, for instance, it was found that wrought steel railroad wheels, which were increasingly popular with the roads, were being manufactured in literally hundreds of designs by the steel companies—so many designs that the constant change from one to another hindered output. One steel company alone in one year made over 500 designs of these wheels in order to meet its customers' requirements. So steel metallurgists and railroad representatives joined in a study of specifications. As a result, the railroads reduced the number of designs to 73. With only a fraction as many designs to deal with as formerly, the wheel plants give more of their attention to actual production. In the past few years wrought steel wheel output has averaged over 300,000 tons a year, about half again as much as a decade earlier.

Standards From Other Countries

Members of the American Standards Association may borrow from the ASA Library copies of any of the following standards recently received from other countries. Orders may also be sent to the country of origin through the ASA office. The titles of the standards are given here in English, but the documents themselves are in the language of the country from which they were received. For the convenience of our readers, the standards are listed under their general UDC classifications.

003.62 Signs, Notations, Symbols

Spain	*UNE*
Graphical symbols for transmissions	1046
Letter symbols used in thermodynamics	5014

313.1 Statistics of Accidents, Illnesses, and Their Results

Australia	*SAA*
Code of recommended practice for the recording of industrial accidents	CZ.6-1952

331 Labor

Spain	*UNE*
Standardization of labor statistics	4050

347.4 Contracts

Australia	*SAA*
General conditions of tendering and contract for civil engineering works	CA24-1952

536 Heat. Thermodynamics

Germany	*DIN*
Thermometers	16160
Spain	***UNE***
Mechanical equivalent of heat	5012
United Kingdom	***BS***
Commercial platinum resistance thermometer elements	1904:1952

542.1/.23 Chemical Laboratories. Equipment and Arrangement

Germany	*DIN*
Filtering flask	12475
Poland	***PN***
12 standards for different laboratory accessories	Z-53004/-53008, C-01500,-13021,-13025, -13044,-60008/60010
United Kingdom	***BS***
Flasks for the determination of distillation range	571:1953

543/.3 Analytical Chemistry

Poland	*PN*
7 standards related to carrying chemical analysis	C-01400,-04340, -04504/04508
Spain	***UNE***
Determination of acidity of benzene, toluene, etc	7038
Switzerland	***SNV***
Determination of carbonic acids content	81509

549 Mineralogy

India	*I.S.*
French chalk, technical	380

615/.4 Pharmacy. Therapeutics

Germany	*DIN*
Electrocardiograph	13401
Poland	***PN***
40 standards for different surgical, stomatological, and veterinary instruments	Series Z-53000, -54000,-56000,-57000,-58000
11 standards for different medical laboratory equipment	Series Z-65000
4 standards for dressing material	Z-85011,-85013, -85022,-85119
4 standards for dressing material	Z-85018,-85021,-85082/3
9 standards for surgical instruments	Z-54083,-54108,-54121, -55183,-57032,-58007, -58015,-58017,-66011
3 standards for pharmacists' tools	Z-66010,-66016,-66020
Dressing gauze	Z-85019
7 standards for doctor's stethoscope	Z-53083/-53089
Kramer frame	Z-54521
Blunt womb spatula	Z-58016
Two-bottle pedal wash basin	Z-78085
Prosection table	Z-78095
7 standards for surgical instruments	Z-54003,-54115/54120
United Kingdom	***BS***
Instrument tables, anaesthetists' trolleys, and dressings trolley for use in hospitals	1938:1953
Patients' trolleys (fixed top) for indoor use in hospitals	1962:1953

621.13 Railway Steam Locomotives

Germany	*DIN*
Hexagon head plugs, Whitworth thread	30329
Control handles	30425
Cylindrical keys	30525
Journals, different types	31260
4 standards for fittings	31265, 31268, 31282/3
4 standards for flanges	31482/3,-87,-95
Pressure testing cock	33046
Conduits for electric wiring	35771
Hand-holds	36010
Mechanic's folding seat	36144
Universal joint	37361
Locomotive boiler tubes	38031
Metric and Whitworth screws used in locomotives	30280
Countersunk head through bolts	30332, 30333
Fillister head through bolts	30340, 30341
Wrench, open-end, single	30382
Taper control handle	30426
Duct-bolts	31264
Tee-fittings	31266, 31267
Threaded connectors and nuts	31272, 31273
Nipples	31275, 31276
Hexagon cap screws	31280
6 types of bushings	31274, 31281, 31491, 31492, 31493, 31494
Seamless steel and copper tubing	31780
Washout doors	32126, 32136, 32141
Governor pipe for nominal pressures 80 to 200	32330
Hook-head bolts	32392
Stopcocks' plugs	33044
Stopcocks' spring and washer	33077
Set screw for leaf springs	34010
Foot steps	36251
Water feed valve	36511
Spain	***UNE***
Washout doors	25038

621.56/.59 Refrigeration

Germany	*DIN*
Testing specifications of household refrigerators	8950
Poland	***PN***
Color code for gas cylinders	M-69210

621.753 Tolerances. Fittings. Gages

Germany	*DIN*
Internal gage for diameter from 10 to 350 mm	2253, B1.2
United Kingdom	***BS***
Limits and fits for engineering, Part 1: Limits and Tolerances	1916:Part 1:1953

621.82/.83 Transmission Parts

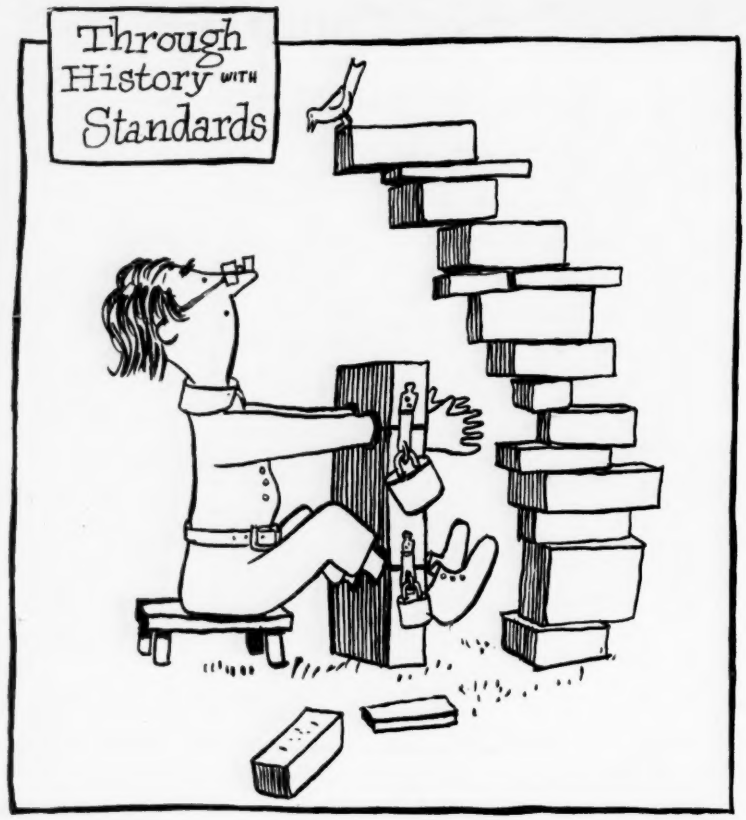
Belgium	*NBN*
Splined shafts and hubs (involute)	270
Germany	***DIN***
Balls for ball bearings	5401
Spur gears, tolerances	3962, B1.1-4
Spain	***UNE***
Gearing	18022
Table showing different types of gearing	18012

624 Civil Engineering

Czechoslovakia	*CSN*
Design of steel constructions	050110
Germany	***DIN***
Rules for calculation of steel structures	4114, B1.2
Wall building. Calculation	1053
Reinforced concrete poles	4234
Israel	***SI***
Wooden window frames, hinged	77.1
Spain	***UNE***
Nomenclature of soil for excavation	24013

625.1 Railways. Railway Construction

Poland	*PN*
Rolled carbon steel sections for locomotives	K-15001
Loose flanges for locomotives	K-74063
5 standards for railway type ash trays	K-89101/-89105
Spain	***UNE***
Rail bolts and nuts	25029, 25030



One of a Series

In the Seventeenth Century, a Standard Size Building Brick Was Compulsory

A term in the stocks with a pile of out-size bricks to contemplate—that could have been the penalty of early builders back in 1689 when Boston was destroyed by fire. It was a civic crime for brickmakers to make bricks other than 9 in. x 4 in. x 4in. in size. City fathers recognized standardization as essential to the most economic and speedy rebuilding of the city.

Even 275 years ago the bricks were only one inch off the idea of the Modular Method which is now being rapidly advanced in the building industry. The activities of Project A62, organized by the American Standards Association in 1939, are spearheading this advance.

The Modular Method is the standardization of all building materials on a uniform basis of dimensioning. The architect figures everything that goes into a building on the basis of a standard module—multiples of four inches—in all directions.

Thus lumber, bricks, tile, concrete blocks, wall board, flue linings, and framing fit in place without alteration and leave space for doors, windows, cabinets, and other pieces to slide into place.

The four-inch module was chosen because (1) it is large enough for manufacturers to reduce the number of stock sizes and still satisfy consumer demand; (2) it is small enough for ample freedom in architectural design and for flexibility in equipment layout; (3) it coincides with the dimensions of a great many building materials already standardized and is applicable to present construction practices; (4) it is a unit measurement with which architects, builders, and carpenters already are familiar; (5) it approximates 10 centimeters (3.9 inches), the basis proposed by metric system countries working on the same problem.

The module means the elimination of many odd sizes and thus permits smaller inventory for the manufacturer. It means smaller inventories and speedier service for dealers. There is less time spent in drafting and more time for improved design for architects. Easier estimating, more efficient methods on the job, less construction time are possible for the contractor. When the modular method is used, everything fits. There is no needless, wasteful hand-cutting at the building site.

643.3 Kitchen Equipment

Australia — ***SAA***

Specification (Housing Series) for kitchen fitments manufactured from wood — Int 305, Aug 1952

France — ***NF***

Pressure cookers — D 21-351

Gas heaters — D 35-332

Characteristics of aluminum and its alloys used for manufacturing of pressure cookers — D 21-441

645/.4 Furniture and Accessories

France — ***NF***

Terminology of furniture, general — D 60-001

Netherlands — ***N***

2 standards for chairs and desks for schools — *V* 1796, 1797

United Kingdom — ***BS***

Domestic bedding excluding cellular rubber bedding. Part 9: Upholstered Wood-framed Bases — 1877:Part 9:1953

Domestic furniture constructed mainly of wood. Part 1: Dining-type Chairs — 1960:Part 1:1953

Domestic furniture constructed mainly of wood. Part 2: Cabinet Goods for Storage Purposes — 1960:Part 2:1953

Domestic furniture constructed mainly of wood. Tables — 1960:Part 3: 1953

Folding wooden domestic ironing tables — 1959:1953

651.4/.7 Office Administration. Efficiency

Germany — ***DIN***

Brief folders and binders — 821, B1.1

Poland — ***PN***

Office supplies — F-94014,-94035

5 standards for different office equipment — F-94005,-94008,-94048, -94009,-94051

661/.3 Chemical Products in the Narrower Sense

Czechoslovakia — ***CSN***

Sulfuric acid — 685000

New Zealand — ***NZSS***

Standard specifications for alkaline cleansers (excluding soaps) — 878, Nov 1951

Poland — ***PN***

Potassium bromide reagent — C-80045

4 standards for organic chemicals, technical — C-83006,-83008, -83011,-85014

2 standards for inorganic chemicals, technical — C-84054,-84065

Spain — ***UNE***

Density and composition of aqueous solutions of nitric acids — 30027

676 Paper and Cardboard Industry

Netherlands — ***N***

2 standards for paper testing — 1762, 1763

Poland — ***PN***

5 standards for different kinds of industrial and household paper — P-95503,-96002,-96014, -96020,-96021

678 Rubber Industry

Netherlands — ***N***

2 standards for rubber rings for gas conduit joints — 1578, 1579

Poland — ***PN***

17 standards for different chemical tests of rubber — C-04211/-04213,-04219/ -04230,-04232,-04238

697/.3 Heating and Ventilation

Austria — ***ÖNORM***

Open-type water heating system — B 8130

Germany — ***DIN***

Hot water tank in stoves — 18886

Announcing New Books . . . .

• **The Measurement of Industrial Noise.** By G. L. Bonvallet. (Reprinted from *American Industrial Hygiene Association Quarterly*, September, 1952, and distributed by National Association of Mutual Casualty Companies, 20 North Wacker Drive, Chicago 6, Ill., as "Technical Guide No. 5." No charge.)

Mr Bonvallet has directed his paper on "The Measurement of Industrial Noise" to the safety engineer and the industrial hygienist. Very little knowledge of acoustics is required to understand this paper. It is an excellent introduction into the subject, explaining the principles of sound, the physical principles underlying noise measurements, and discussing the ear and hearing. It reviews, also, the available sound-measuring equipment and explains its use by means of case histories. It offers to the professional man entering the field of acoustics a short résumé of extremely well-selected material as a basis for activities in this field.

Machine noise is due to vibrating surfaces, the whine of fan blades, or the air-rush through ducts. This noise may be a steady-state noise, pitched or non-pitched. Noise from a horn or a siren is an example of pitched noise. The noise from a blower is an example of a steady-state noise which is non-pitched. A large number of noises experienced in connection with industrial acoustics are not steady-state but are rather of transient character.

The sound-pressure level is measured in decibels. The decibel is an entirely physical unit referring to a pressure. For a single tone, the loudness can be determined from a sound-level meter measurement, using the appropriate network. This, however, does not hold true for complex tone. For white noise, an octave-band filter should be used together with the sound-level meter. An octave analysis is made, and the loudness is determined from a chart published in this paper. This method is useful when deafness risk is to be determined.

For an analysis of sound, it is generally desirable to use additional equipment with a sound-level meter. This equipment may be the previously-mentioned octave-band filter, narrow-band analyzers, level recorders, headphones, and oscilloscopes. For transient measurements, the oscilloscope is invaluable, particularly in connection with an octave-band filter. Often a vibration-measuring equipment should be used to trace the origin of the noise.

Certain precautions are in order for sound measurements. The microphones used with the sound level meter are generally made from Rochelle Salt. When the temperature exceeds 100F, the measurements made with such a microphone become inaccurate. When the microphone is heated above 125F, it is permanently damaged.

Erroneous signals may be introduced by microphonics. These may be caused by high noise level near the tubes or vibration of the amplifying equipment. To obtain proper reading, the placement of the microphone is of importance. To determine the levels at the place where personnel is located, the microphone should be placed in the same location. The microphone should not be placed in air currents. To determine the reverberant level in contrast to the direct radiated sound, the microphone should be located at a distance from the noise source. Corrections for background noise should be made. Curves for this correction are available.

Reviewed by R. O. Fehr, Electro-Mechanical Engineering Services Department, General Engineering Laboratory, General Electric Company, Schenectady, N. Y.

• **American Standard L22—Your Key to Better Textiles.** (American Standards Association, 70 East 45 Street, New York 17, N. Y. 16 pp. Illustrated. 10 cents.)

This is a discussion in layman's language of what the consumer can do to be sure he is getting serviceable rayon and acetate.

American Standard L22 is the name of the set of standards or minimum requirements for fabrics whose composition includes half or more of rayon or acetate fabric (STANDARDIZATION, June, p 165).

L22 is the first effort of business and consumers to draw up common definitions that will mean the same thing to all the people who manufacture, weave, knit, dye, treat, cut, fashion, dry clean, launder, purchase, and sell the fabric.

Every person connected with the industry, the booklet states, will benefit from the application of the specifications and standards set forth in L22, through increased good will, reduction of complaints against the fabric, in knowing exactly what cleaning and laundering techniques to use, and in superior performance of the articles purchased.

The booklet adds that the L22 standard is voluntary and can be made effective only if the consuming public indicates a demand for products made according to the standard, by looking for and asking for the L22 tags and labels.

The consumer, it points out, cannot become an expert in how the goods are made, but he or she can now know exactly how they will perform in any one of rayon's 51 common end-uses covered in the American Standard if they meet the specified requirements.

• **Materials Handling.** By John R. Immer. (McGraw-Hill Book Company, 330 West 42nd Street, New York 36, N. Y. $8.00.)

This book discusses motion and time studies in relation to work simplification, and outlines methods of showing the flow of materials through the plant. It also discusses the selection and use of materials-handling equipment; packaging and shipping methods and materials; methods of analysis of handling problems; and how to determine handling costs; as well as special handling problems. An interesting historical section traces the use of materials-handling equipment from the beginning of standardization in about 1500 to present-day highly standardized mass-production methods.

ASTM Elects New Officers

THE American Society for Testing Materials elected Leslie C. Beard, Jr, as president for 1953-1954 at its Annual Meeting during the week of June 28 at Atlantic City. Mr Beard is Assistant Director of Socony-Vacuum Laboratories, Socony-Vacuum Oil Company, Inc, New York, N. Y. He succeeds H. L. Maxwell, Technical Adviser, Engineering Department, E. I. duPont de Nemours and Company, Inc, Wilmington, Del, who continues on the Board of Directors as Past-President for three years.

C. H. Fellows, Director, Engineering Laboratory and Research Department, The Detroit Edison Company, Detroit, Michigan, is the new ASTM Vice-President.

New members of ASTM's Board of Directors are: N. A. Fowler, Director of Sales and Research, General Box Company, Des Plaines, Ill.; R. T. Kropf, Vice-President, Industrial Thread Division, Belding Heminway Corticelli, New York, N. Y.; T. F. Olt, Director, Research Laboratories, Armco Steel Corporation, Middletown, Ohio; J. R. Townsend, Director of Material and Standards Engineering, Sandia Corporation, Sandia Base, Albuquerque, New Mexico; and K. B. Woods, Associate Director, Joint Highway Research Project and Professor of Highway Engineering, Purdue University, Engineering Experiment Station, Lafayette, Ind.

Sixty-three new specifications and tests were approved during the Annual Meeting, and revisions in 185 existing tentatives and standards were acted on. As a result of action at the meeting, 62 specifications and tests previously published as tentative are being referred to letter ballot of the Society for adoption as standard. These will all be published in the 1953 Supplement to the Book of ASTM Standards.

ASTM reports a present total of 1965 ASTM Standards, compared with 1200 ten years ago.

WHAT IS YOUR QUESTION?

Can you give me information about the expense and the work required to start a medical service in our company?

Information that may be helpful is contained in Section 23 of the *Accident Prevention Manual*, published by the National Safety Council, and to the chapter on first aid and hospitals in the *Handbook of Industrial Safety Standards*, published by the Association of Casualty and Surety Companies. A number of the books referred to in these manuals may also be helpful, for example:

Industrial Health Practices, published by the National Association of Manufacturers. This is the report of a survey of 2064 industrial establishments by Victor G. Heiser, M.D.

Medical Service in Industry and Workmen's Compensation Laws, by Gaylord R. Hess, published by the American College of Surgeons.

"Industrial Medical Potentials—A Time and Job Analysis of Medicine in Industry," by William J. Fulton, M.D., published in the magazine, *Industrial Medicine and Surgery of Trauma*, Vol XVIII: 270-282, July, 1949.

"Council on Industrial Health—Medical Service in Industry: The Industrial Medical Department—Quarters and Equipment," published in *The Journal of the American Medical Association*, Vol CXVII: 34-35, July 5, 1941.

We suggest you also get in touch with these three organizations:

Industrial Medical Association
Dr Edward C. Holmblad, Treasurer and Managing Director
38 East Jackson Boulevard
Chicago 4, Illinois

National Safety Council
425 North Michigan Avenue
Chicago 11, Illinois

Association of Casualty and Surety Companies
60 John Street
New York 38, N. Y.

How can we identify valves in a piping system so as to show whether they should be in the open or closed position under normal operating conditions? It has been suggested that we color our valves either red or green. This would follow the same pattern as that used on electric switchboards, where red or green signal lights indicate whether or not a switch is closed or open. However, if such a scheme were adopted, there might be confusion between the red to indicate fire protection equipment and green to indicate a safe material as called for in the American Standard Scheme for Identification of Piping Systems, A13-1928.

ASA does not know of any nationally recognized standard for designating or identifying which valves in a piping system should normally be in the open position or in the closed position.

The nearest thing to it on a national scale is a system used by fire insurance companies to tag sprinkler valves which are normally kept closed in winter. Further information on tagging closed sprinkler valves may be obtained from the National Fire Protection Association, 60 Batterymarch Street, Boston 17, Massachusetts.

We have been advised that on board ships in particular cases the Navy uses a system of round metal discs solidly bolted to the valves. Each disc carries a message, such as "This valve must always be kept closed."

Can you help us locate a standard for furniture drawer pulls and screws?

Specifications for drawer pulls and fastenings are contained in the Federal Specification on Hardware, Builders; Shelf and Miscellaneous, FF-H-111a. This specification includes a section covering types, materials, dimensions, and attachments for drawer pulls.

Do you have blueprints of American Standard core and drill bits?

There is no American Standard but there is a Commercial Standard-CS 14-47, Diamond Core Drill Fittings (Fourth edition). Copies can be obtained from the United States Department of Commerce, Washington 25, D. C.

Noise Continues To Be News

A ruling was expected this month from Wisconsin's state Supreme Court on the foundry worker who claimed workmen's compensation for partial loss of hearing—but no loss of earning ability. The case thereby alerted management throughout the nation to the hazard of industrial noise. But the Court ruling is not likely to bring an end to industry's intense interest in the subject. Compensation cases or damage suits may threaten in 47 other states.

Two major problems face industry: First is the legal one, involved in setting orderly and feasible procedures of compensating for genuine injury caused by industrial noise. Second is the complex technical one of improving measurement of noise, fixing standards, indeed, determining such basic facts as what kinds of noise in what quantities and what durations cause what kinds of injury.

Medical and legal groups are working on both aspects of the problem, and a big joint research program supported by many industries and groups is under way at Mellon Institute in Pittsburgh. The American Standards Association has just made a contribution to the process of getting the whole subject under control: a new *American Standard Specification for an Octave-Band Filter Set* for analysis of noise and other sounds.

The new standard takes cognizance of the fact that sound-level meters have usually been inadequate for determining damaging effects of noise, an Association committee says. This is because tolerable levels of noise differ according to the frequency bands.

Use of both the sound-level meter and the octave-band analyzer is recommended. The new standard helps make it possible to get uniform analysis of data.

From *Modern Industry*, June 15, 1953, Vol XXV, Number 6, pp 94 and 96.

AMERICAN STANDARDS

Status as of July 21, 1953

Legend

Standards Council — Approval of Standards Council is final approval as American Standard; usually requires 4 weeks.

Board of Review—Acts for Standards Council and gives final approval as American Standard; action usually requires 2 weeks.

Standards Boards—Approve standards to send to Standards Council or Board of Review for final action; approval by standards boards usually takes 4 weeks.

Acoustics

American Standard Approved—

Speech Audiometers, Specification for, Z24.13-1953

Sponsor: Acoustical Society of America

Standard Submitted—

Method of Specifying the Performance of Frequency Analyzers, Z24.15

Sponsor: Acoustical Society of America

Arbitration

In Miscellaneous Standards Board—

Commercial Arbitration, Standards for

Sponsor: American Arbitration Association

Building

American Standards Published—

Gypsum Sheathing Board, Specifications for, ASTM C79-52; ASA Z68.1-1953 (Revision of ASTM C79-50; ASA A68.1-1951) $0.25

Gypsum Wall Board, Specifications for, ASTM C36-52; ASA A69.1-1953 (Revision of ASTM C36-50; ASA A69.1-1951) $0.25

Methods of Testing Gypsum and Gypsum Products, ASTM C26-52; ASA A70.1-1953 (Revision of ASTM C26-50; ASA A70.1-1951) $0.25

In Construction Standards Board—

Building Code Requirements and Good Practice Recommendations for Masonry, A41.1 (Revision of A41.1-1944)

Building Code Requirements for Minimum Design Loads in Buildings and Other Structures, A58.1

Sponsor: National Bureau of Standards

Standard Submitted—

National Plumbing Code, A40

Sponsors: The American Public Health Association; The American Society of Mechanical Engineers

Reaffirmation Being Considered by Construction Standards Board—

Manhole Frames and Covers, for Subsurface Structures, A35.1-1941 (Reaffirmed 1947)

Sponsor: Construction Standards Board

Chemical Industry

In Board of Review—

Method of Test for Toluene Insoluble Matter in Rosin, ASTM D269-52; ASA K21.1 (Revision of ASTM D269-30; ASA K21.1-1936)

Sponsor: American Society for Testing Materials

Consumer

American Standards Published—

Ordinary Bar Soap, Specifications for, ASTM D497-52; ASA K60.2-1953 (Revision of ASTM D497-39; ASA K60.2-1949) $0.25

Palm Oil Chip Soap (Type A, Straight; Type B, Blended), Specifications for, ASTM D536-52; ASA K60.16-1953 (Revision of ASTM D536-42; ASA K60.16-1949) $0.25

Sponsor: American Society for Testing Materials

Drawings and Symbols

Reaffirmation Being Considered by Graphic Standards Board—

Graphical Symbols for Heating, Ventilating, and Air Conditioning, Z32.2.4-1949

Graphical Symbols for Welding, Z32.2.1-1949

Sponsors: The American Society of Mechanical Engineers; American Institute of Electrical Engineers

Letter Symbols for Mechanics of Solid Bodies, Z10.3-1948

Sponsor: The American Society of Mechanical Engineers

Electrical

American Standards Published—

Copper Trolley Wire, Specifications for, ASTM B47-52; ASA C7.6-1953 (Revision of ASTM B47-49; ASA C7.6-1951) $0.25

Requirements for round and grooved hard-drawn copper trolley wire, including dimensions of standard sections known as "American Standard Grooved Trolley Wire Sections."

Sponsor: American Society for Testing Materials

Direct-Acting Electrical Recording Instruments, Switchboard and Portable Types, C39.2-1953 $0.75

Applies to the following types of direct-acting electrical recording instruments for direct and alternating currents: ammeters, voltmeters, wattmeters, varmeters (reactive volt-ampere meters), frequency meters, power-factor and phase-angle meters. It includes definitions, general requirements, test conditions, and test requirements.

Sponsor: Electrical Standards Board

American Standards Approved—

Cotton Covered Round Copper Magnet Wire, C9.2-1953 (Revision of C8.5-1936)

Enamel Coated Round Copper Magnet Wire, C9.1-1953 (Revision of C8.7-1936)

Nylon Fibre Covered Round Copper Magnet Wire, C9.4-1953

Silk Covered Round Copper Magnet Wire, C9.3-1953 (Revision of C8.6-1936)

Sponsor: National Electrical Manufacturers Association

In Board of Review—

Grounding Caps and Receptacles Rated 15 Amperes, 250 Volts and 30 Amperes, 250 Volts, Requirements for, C73a (Revision of C73b-1951)

Grounding-Type Attachment Plug Caps and Receptacles, C73a (Revision of C73a-1950)

Sponsor: National Electrical Manufacturers Association

In Electrical Standards Board—

Flexible Cord and Fixture Wire, C33.1

Sponsor: Underwriters' Laboratories

Incandescent Lamps: Infrared Lamp for 115-125 Volt Service, C78.106 (Revision of C78.106-1949)

Incandescent Lamps: Miniature Incandescent Lamps, C78.140 (Revision of C78.140-1949)

Sponsor: Electrical Standards Board

Rigid Steel Conduit, Enameled, Specification for, C80.2 (Revision of C80.2-1950)

Rigid Steel Conduit, Zinc Coated, Specification for, C80.1 (Revision of C80.1-1950)

Sponsors: American Iron and Steel Institute; National Electrical Manufacturers Association

Reaffirmation Being Considered by Electrical Standards Board—

Electrical Metallic Tubing, Zinc Coated, Specification for, C80.3-1950

Sponsors: American Iron and Steel Institute; National Electrical Manufactuers Association

Withdrawal Requested—

Incandescent Lamps: G-30 Bulb, Medium Skirted Screw Base, C78.249-1949

Loading and Operation of Instrument Transformers, Guide for, C57.33-1953

Loading Current-Limiting Reactors, Guide for, C57.36-1948

Loading Oil-Immersed Distribution and Power Transformers, Guide for, C57.32-1948

Loading Pole-Type Constant-Current Transformers, Guide for, C57.34-1948

Loading Step-Voltage and Induction-Voltage Regulators, Guide for, C57.35-1948

Operation of Transformers, Regulators, and Reactors at Altitudes Greater Than 3300 Feet (1000 Meters), Guide for, C57.31-1948

Sponsor: Electrical Standards Board

Fuels

American Standard Approved—

Definitions of the Terms Gross Calorific Value and Net Calorific Value of Solid

and Liquid Fuels, ASTM D407-44; ASA Z67.1-1953

Sponsor: American Society for Testing Materials

Gas-Burning Appliances

In Miscellaneous Standards Board—

Addenda to Approval Requirements for Domestic Gas Ranges (Z21.1-1952), Z21.1a

Addenda to Approval Requirements for Domestic Gas-Fired Incinerators (Z21.6-1949), Z21.6a

Addenda to Approval Requirements for Gas-Fired Room Heaters (Z21.11-1949), Z21.11b

Addenda to Approval Requirements for Gas Unit Heaters (Z21.16-1951), Z21.16a

Approval Requirements for Central Heating Gas Appliances, Volume IV, Gravity and Fan Type Vented Recessed Heaters, Z21.13.4 (Revision of Z21.13.4-1951)

Approval Requirements for Domestic Gas Clothes Dryers, Z21.5 (Revision of Z21.5-1940)

Approval Requirements for Gas Water Heaters, Z21.10 (Revision of Z21.10-1950, Z21.10a-1951, and Z21.10b-1952)

Sponsor: American Gas Association, Inc

Reaffirmation Approved—

Attachable Gas Water Heating Units, Listing Requirements for, Z21.26-1941 (Reaffirmed 1947, 1950, 1953)

Draft Hoods, Listing Requirements for, Z21.12-1937 (Reaffirmed 1947, 1950, 1953)

Furnace Temperature Limit Controls and Fan Controls, Listing Requirements for, Z21.29-1941 (Reaffirmed 1947, 1950, 1953)

Gas Appliance Connectors of Flexible Metal Tubing and Fittings, Listing Requirements for, Z21.32-1942 (Reaffirmed 1947, 1950, 1953)

Gas Appliance Thermostats, Listing Requirements for, Z21.23-1940 (Reaffirmed 1947, 1950, 1953)

Gum Protective Devices, Listing Requirements for, Z21.35-1945 (Reaffirmed 1950, 1953)

Installation of Gas Equipment in Large Boilers, Requirements for, Z21.33-1950 (Reaffirmed 1953)

Refrigerators Using Gas Fuel, Requirements for, Z21.19-1941 (Reaffirmed 1947, 1950, 1953)

Relief and Automatic Gas Shut-off Valves for Use on Water Heating Systems, Listing Requirements for, Z21.22-1935 (Reaffirmed 1947, 1950, 1953)

Semi-Rigid Gas Appliance Tubing and Fittings, Listing Requirements for, Z21.24-1941 (Reaffirmed 1947, 1953)

Sponsor: American Gas Association, Inc

Mechanical

American Standard Published—

Small Solid Rivets, B18.1-1953 (Revision of Small Rivets, B18a-1927 and B18al-1942; and Tinners, Coopers, and Belt Rivets, B18g-1928 and B18g1-1942) $1.00

Sponsors: Society of Automotive Engineers; The American Society of Mechanical Engineers

New Projects Initiated—

Industrial Diamonds and Accessories for Their Use, B67

Sponsors: American Society of Tool Engineers, Inc; Industrial Diamond Association of America, Inc

Performance Standards for Small Sawmills, B66

Sponsor: The American Society of Mechanical Engineers

Reaffirmation Being Considered by Mechanical Standards Board—

Indicating Pressure and Vacuum Gages, Round, Dial-Type with Elastic Pressure Chamber, B40.1-1939 (Reaffirmed 1947)

Sponsor: The American Society of Mechanical Engineers

Motion Pictures

In Photographic Standards Board—

Sixteen-Millimeter Motion Picture Projection Reels, PH22.11 (Revision of PH22.11-1952)

Sponsor: Society of Motion Picture and Television Engineers

Paints and Varnishes

In Board of Review—

Method of Test for Mass Color and Tinting Strength of Color Pigments, ASTM D387-52; ASA K57 (Revision of ASTM D387-36; ASA K57-1941)

Methods of Test for Specific Gravity of Pigments, ASTM D153-52; ASA K41 (Revision of ASTM D153-39; ASA K41-1939)

Sponsor: American Society for Testing Materials

Petroleum Products and Lubricants

American Standards Published—

Method of Test for Acetylene in Polymerization-Grade Butadiene (Silver Nitrate Method), ASTM D1020-52; ASA Z11.74-1952 $0.25

Method of Test for Flash and Fire Points by Means of Open Cup, ASTM D92-52; ASA Z11.6-1952 (Revision of ASTM D92-46; ASA Z11.6-1947) $0.25

Method of Test for Neutralization Value (Acid and Base Numbers) by Potentiometric Titration, ASTM D664-52; ASA Z11.59-1952 (Revision of ASTM D664-51; ASA Z11.59-1951) $0.25

Method of Test for Nonvolatile Residue of Polymerization Grade Butadiene, ASTM D1025-52; ASA Z11.76-1952 $0.25

Method of Test of Separation of Residue From Butadiene, ASTM D1023-52; ASA Z11.75-1952 $0.25

Sponsor: American Society for Testing Materials

Photography

American Standards Approved—

Attachment Threads for Lens Accessories, Specifications for, PH3.12-1953 (Revision of Z38.4.12-1944)

Contact Printers, Specifications for, PH3.8-1953 (Revision of Z38.7.10-1944)

Dimensons for Photographic Paper Rolls, PH1.11-1953 (Revision of Z38.1.5-1943 and partial revision of Z38.1.6-1943)

Dimensions for Photographic Paper Sheets, PH1.12-1953 (Partial revision of Z38.1.6-1943 and revision of Z38.1.43-1947)

Masks (Separate) for Use in Photographic Contact Printing of Roll Film Negatives, Specifications for, PH3.9-1953 (Revision of Z38.7.12-1944)

Photographic Grade Ammonium Chloride NH_4Cl), Specification for, PH4.183-1953

Photographic Grade Ammonium Sulfate, $(NH_4)_2SO_4$, Specification for, PH4.184-1953

Photographic Grade Blotters, PH4.10-1953

Stereo Still Pictures on 35-Millimeter Film (5-Perforation Format), PH3.11-1953

Sponsor: Photographic Standards Board

In Board of Review—

Method for Determining the Relative Photographic Efficiency of Illuminants, PH2.3

Method for Determining Exposure Guide Numbers for Photographic Lamps, PH2.4

Sponsor: Photographic Standards Board

Pipe and Fittings

In Mechanical Standards Board—

Cast-Iron Screwed Drainage Fittings, B16.12 (Revision of B16.12-1942)

Sponsors: Manufacturers Standardization Society of the Valve and Fittings Industry; Heating, Piping, and Air Conditioning Contractors National Association; The American Society of Mechanical Engineers

Rubber

In Board of Review—

Method of Tension Testing of Vulcanized Rubber, ASTM D412-51T; ASA J2.1 (Revision of ASTM D412-41; ASA J2.1-1942)

Method of Test for Accelerated Aging of Vulcanized Rubber by the Oven Method, ASTM D573-52; ASA J5.1 (Revision of ASTM D573-48; ASA J5.1-1949)

Method of Test for Accelerated Aging of Vulcanized Rubber by the Oxygen-Pressure Method, ASTM D572-52; ASA J4.1 (Revision of ASTM D572-48; ASA J4.1-1949)

Methods of Sample Preparation for Physical Testing of Rubber Products, ASTM D15-52T; ASA J1.1 (Revision of ASTM D15-41; ASA J1.1-1942)

Sponsor: American Society for Testing Materials

Safety

New Project Requested—

Mechanized Household Equipment, Safety Code for

Requested by: American Mutual Liability Insurance Co

Wood Industry

Withdrawal Requested—

Cross Ties and Switch Ties, Specifications for, 03-1926

Sponsors: American Railway Engineering Association; Forest Products Laboratory

Motor Oil Cans, B64—

A drafting committee appointed by the General Conference recently called by ASA to consider the development of American Standards on Motor Oil Cans has submitted to the Conference a draft of a proposed American Standard for one-quart motor oil cans. Upon approval by the Conference, the proposal will be presented to the ASA for adoption as American Standard.

Photographic Documentation, PH5—

Sponsor: Council of the National Library Association

Better reading quality and greater permanence of documents reproduced photographically is the goal established by Committee PH5 of the American Standards Association at its first meeting June 25. The committee's task will be to set standards for photographic materials, apparatus, and processes pertaining to production, use, storage, and preservation of document reproductions.

The Council of the National Library Associations is taking the leadership of the committee as sponsor under ASA procedure. Membership includes manufacturers and users of microfilm records.

Three subcommittees were set up at the June 25 meeting—on micro-transparencies; on micro-opaques; and on documents readable without optical devices.

The subcommittee on micro-transparencies will work on proposed standards connected in any way with the production, use, and preservation of microfilms, and equipment for reading them. V. J. Moyes, Eastman Kodak Company, was elected chairman of this subcommittee.

The subcommittee on micro-opaques will work on micro-cards and similar micro-reproductions on paper or other opaque substances, and reading equipment. Fremont Rider, chairman of the Board of the Microcard Foundation, was elected chairman.

George Mott, The Haloid Company, was named to serve as chairman of the subcommittee on documents readable without optical devices, covering photostats and blueprints and similar normal size reproductions.

This committee will represent the American viewpoint in work now going on in a committee of the International Organization for Standardization. The French national standards association holds the secretariat for Subcommittee 1 on Documentary Reproduction of the ISO Technical Committee 46 on Documentation. Paul Arnold, chairman of the Photographic Standards Board of the American Standards Association, represented the United States at a meeting in Paris, July 1-4. This meeting was called by the French association to study microfilm readers. The study is being carried out by the ISO Committee under a contract with UNESCO. It will include capacity of readers to accept various microtext formats, luminosity, absence of distortion, correct rendering of black and white tones, and ease in use. It is hoped that the work will result in unified standards for readability and quality of microfilms and microfilm readers in the countries that are members of the International Organization.

Ralph H. Carruthers, Chief, Photographic Service, New York Public Library, served as chairman at the June 25 meeting of the new ASA Committee PH5. A nominating committee was named to propose permanent officers. The next meeting of the committee is tentatively scheduled for early in September.

Acoustics, Vibration, and Shock, Z24—

Sponsor: Acoustical Society of America

This committee was formerly known as the Sectional Committee on Acoustical Measurements and Terminology. Its name was changed to reflect its broadened scope. The revised scope as submitted reads: "Standards, specifications, and methods of measurement and test in the fields of acoustics, vibration, and mechanical shock, including terminology, units, scales, and levels, and their relation to safety, tolerance, and comfort."

The former scope, "Preparation of standards of terminology, units, scales, and methods of measurement in the fields of acoustics and mechanical vibration," was believed to be too restrictive in view of the expanding work of the committee.

Laurence Batchelder, Submarine Signal Division, Raytheon Manufacturing Company, Newton, Massachusetts, took office as chairman of Committee Z24 in July. He represents the Acoustical Society of America as a member of the committee.

NEW ASA PUBLICATIONS

Available from the American Standards Association

"THE MEMBERS OF ASA," 40 pages. The new *membership directory* lists the names of 60 Member-Bodies of ASA, 44 Associate Members, and 2,300 company members. Also listed are four state agencies and seven universities.

"AMERICAN STANDARDS PRICE LIST," 32 pages. Listed are *1,351 American Standards* in *eighteen general fields* including civil engineering and construction, mechanical engineering, electrical engineering, automotive, metallurgy, rubber, chemicals, textiles, mining, wood, pulp and paper, photography, office equipment and supplies, drawings and symbols, and safety.

"INTERNATIONAL ELECTROTECHNICAL COMMISSION GOLDEN JUBILEE 1904-1954," 16 pages. This booklet contains information on program and facilities for next year's meeting of IEC in Philadelphia. It has parallel French and English text and contains a map and photographs.

"AMERICAN STANDARD L22," June, 1953, 16 pages. This is an *illustrated popular presentation* of the meaning and purpose of the American Standard Minimum Requirements for *Rayon and Acetate Fabrics.*

INTERNATIONAL WORK ON MEDICAL EQUIPMENT

To save lives in disaster and on the battlefield, representatives of American groups have voted to participate in international standards projects aimed to bring about international interchangeability in transfusion equipment and stretchers and stretcher carriers.

A conference of government and health specialists and medical supply manufacturers called together by the American Standards Association recommended this move. An international undertaking is now under way under the procedure of the International Organization for Standardization. In addition to cooperation in this ISO project, the conference recommended that corresponding American Standards be developed.

Original proposal of participation came from the Federal Civil Defense Administration. This agency is responsible for the medical care of the civilian population in the event of enemy-created disasters. It now stockpiles medical equipment and uses the specifications of the Armed Services Medical Procurement Agency in its procurement. These specifications will be used as initial proposals in the international discussions.

Captain W. N. Montgomery, USN, speaking in behalf of the ASMPA and the FCDA, stressed the necessity of military specifications gearing in with civilian programs of all countries if civilian supplies are to be drawn on with assurance that they will be usable. He also cited the need for international interchangeability with respect to the medical needs of prisoners of war. Where supplies are turned over by the International Red Cross for the benefit of prisoners, it is essential that they be interchangeable with the supplies of the country holding them.

The conference authorized the organization of advisory committees in both fields to decide the details of American participation and to determine what specifications will be proposed to the international committees which are already functioning. The specifications of the ASMPA are being turned over to the committees for consideration as a basis for these proposals.

• • **Two staff members of the Indian Standards Institution,** Delhi, India, are seeing the USA in terms of standardization and quality control. ASA has mapped their itinerary and arranged visits to industrial plants. The trip is being financed by the Point 4 Technical Assistance Program of the Federal Government.

Maharaj Kishen, graduate of the Lowell Textile Institute, Lowell, Mass., is Assistant Director (Textiles) of the Indian Institution, and is in charge of all textile activities under the Institution's program.

S. K. Sen is Assistant Director (Electrical Engineering) and is in charge of the Institution's work on electrical standards.

Both Mr Kishen and Mr Sen will visit electrical industries, public utilities, and manufacturing companies as well as technical societies and trade associations throughout the United States. The visitors have already attended the private seminar on standardization given by Dr John Gaillard and the Annual Meeting of The American Society for Testing Materials.

These visits are planned to give Mr Sen and Mr Kishen a well-rounded picture of national standardization, industrial and association standardization, and company standardization work in this country.

• • **Meeting in Ottawa June 4,** the Board of Directors of the newly reorganized Canadian Standards Association elected the following officers: *President,* R. E. Jamieson, Dean, Faculty of Engineering, McGill University; *First Vice-President,* J. S. Cameron, Northern Electric Co, Ltd; *Second Vice-President,* E. M. Coles, Canadian Westinghouse Co, Ltd. These three, together with J. G. Morrow, The Steel Co of Canada Ltd; and R. S. Eadie, Dominion Bridge Co, Ltd, will constitute the Executive Committee for two years. Fourteen others were named to the Board of Directors.

• • **Dr Harold S. Osborne** delivered the 25th Steinmetz Memorial Lecture, "What Is Coming in Telecommunications," on May 6, in Schenectady. Dr Osborne, formerly chief engineer of AT&T, has been chairman of ASA Standards Council, member of the Board of Directors, and vice-president of the Association.

• • **Her "creative statesmanship and vision in advancing nationally standards and curricular developments" in home economics** were cited by Stephens College, Columbia, Mo, in awarding an Alumnae Citation to Miss Ardenia Chapman, Dean of the College of Home Economics, Drexel Institute of Technology, Philadelphia. Miss Chapman is a member of the Board of Directors of the American Standards Association and second vice-chairman of its Consumer Standards Board.

Plumbing Contractors Join ASA

Reflecting its current interest in standardization activities, the National Association of Plumbing Contractors (formerly the National Association of Master Plumbers) has become a Member-Body of the American Standards Association. The NAPC has a membership of some 12,000 contractors. A substantial part of its activities involves educational projects along business management lines. Its standardization program, for example, calls for research leading to standard weights, sizes, and basic designs of plumbing equipment. The Association has taken an active part in the research carried out at the National Bureau of Standards for the Uniform Plumbing Code. This research was possibly the most comprehensive of its kind ever undertaken, the Association points out.

Within the past year, the Standardization Committee completed

Charles Le Maistre, CBE, one of the pioneers in standardization, died July 5 after an illness of several months. He was in his eightieth year.

Mr Le Maistre started his career in standardization in 1901 as assistant to the first secretary of the Engineering Standards Committee of Great Britain (now the British Standards Institution). In 1902 he became Electrical Assistant Secretary, and in 1916 succeeded to the post of Secretary. In 1929, when the British Engineering Standards Association (successor to the Engineering Standards Committee) changed its name to the British Standards Institution, Mr Le Maistre became BSI's first Director.

Mr Le Maistre has been widely known in the United States for his activities in the international field. He was General Secretary of the International Electrotechnical Commission from 1904 until his death.

He also played a prominent part in the formation of the United Nations Standards Coordinating Committee, organized during World War II. He served as the Committee's secretary until it was dissolved in 1946 to make way for the International Organization for Standardization.

Although Mr Le Maistre's early training was in electrical engineering, his association with the British Standards Institution brought him into touch with many branches of industry. For his services in connection with standardization during the First World War, he was awarded the CBE.

Mr Le Maistre was a member of the American Institute of Electrical Engineers as well as a Corporate Member of the British Institution of Electrical Engineers.

His international interests also covered the field of documentation. From 1946-1951 he was president of the International Federation for Documentation. For many years he was also a member of the Association of Special Libraries and Information Bureau and served as chairman in 1949-50.

Among honors conferred upon him were the Knight Commander (Second Degree) of the Royal Swedish Order of Vasa, and Honorary Membership of the Royal Dutch Institution of Engineers.

A few weeks before his death the French government made him Chevalier de la Legion d'Honneur.

At its opening session July 7, the Council of the International Organization for Standardization stood silently in prayer as a tribute to Mr Le Maistre. It then passed the following special resolution:

> "The Council of ISO recognizes the unlimited efforts over the years of Charles Le Maistre in the field of international standardization and understanding. His outstanding work will always be an inspiration to the Member Bodies of ISO and the world at large."

Vice-Admiral G. F. Hussey, Jr, Managing Director of the American Standards Association, was one of the official representatives of the International Organization for Standardization at a Memorial Service held in Savoy Chapel, London, July 17. The other ISO representatives were Dr Lal Verman of India, vice-president of ISO, and H.A.R. Binney, Director of the British Standards Institution.

adoption of a standard on service weight soil pipe and fittings. This standard was worked out by the committee in cooperation with the manufacturers.

Frank E. Hess of Los Angeles, chairman of the Association's Standardization Committee, represents the Association on ASA's Standards Council.

October 19, 20, 21

THE FOURTH NATIONAL STANDARDIZATION CONFERENCE

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35th ANNUAL MEETING

Annual Award Luncheon
October 21

The Waldorf-Astoria, New York

Audiometers

(*Continued from page* 238)

for many years as ultimate reference standards for the acuity of hearing.

Another unstandardized feature of pure-tone audiometers used for diagnostic purposes is the bone-conduction receiver. To determine whether a hearing loss is due to faulty sound conduction in the middle ear or to a failure of the sense organ in the inner ear the otologist tests the ability of the patient to hear sounds that are carried to the inner ear by the bones of the skull instead of by air. The "bone-conduction receiver" is pressed against the mastoid bone of the skull. In order to standardize and calibrate the bone-conduction receiver we need to standardize an "artificial mastoid," which will correspond to the "artificial ear" or acoustic coupler that is used to measure the output of the air-conduction receiver. Work on "artificial mastoids" is fairly well advanced and we may hope that standardization of the bone-conduction receiver is only a little more than just around the corner.

The development of these standards for audiometers, both in the past and at present, has been and still is both a stimulus and a pay-off for the efforts of those of us who have been interested in improving the methods for measuring human hearing. The unfinished business is typical of the problems involved in the process of standardization and also illustrates how the the principle of standardization brings to a focus certain problems for further research and development.

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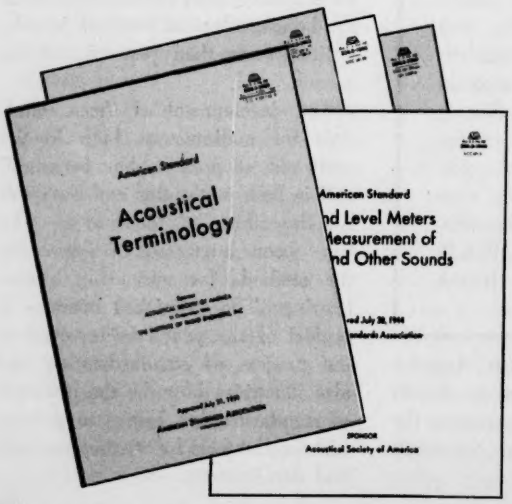
- how to determine the characteristics of hearing aids

Of course, there is still much to do before industry knows all there is to know about noise. ASA committees are studying the problem now. Already they have accomplished a great deal. What they have done is offered you in this package.



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